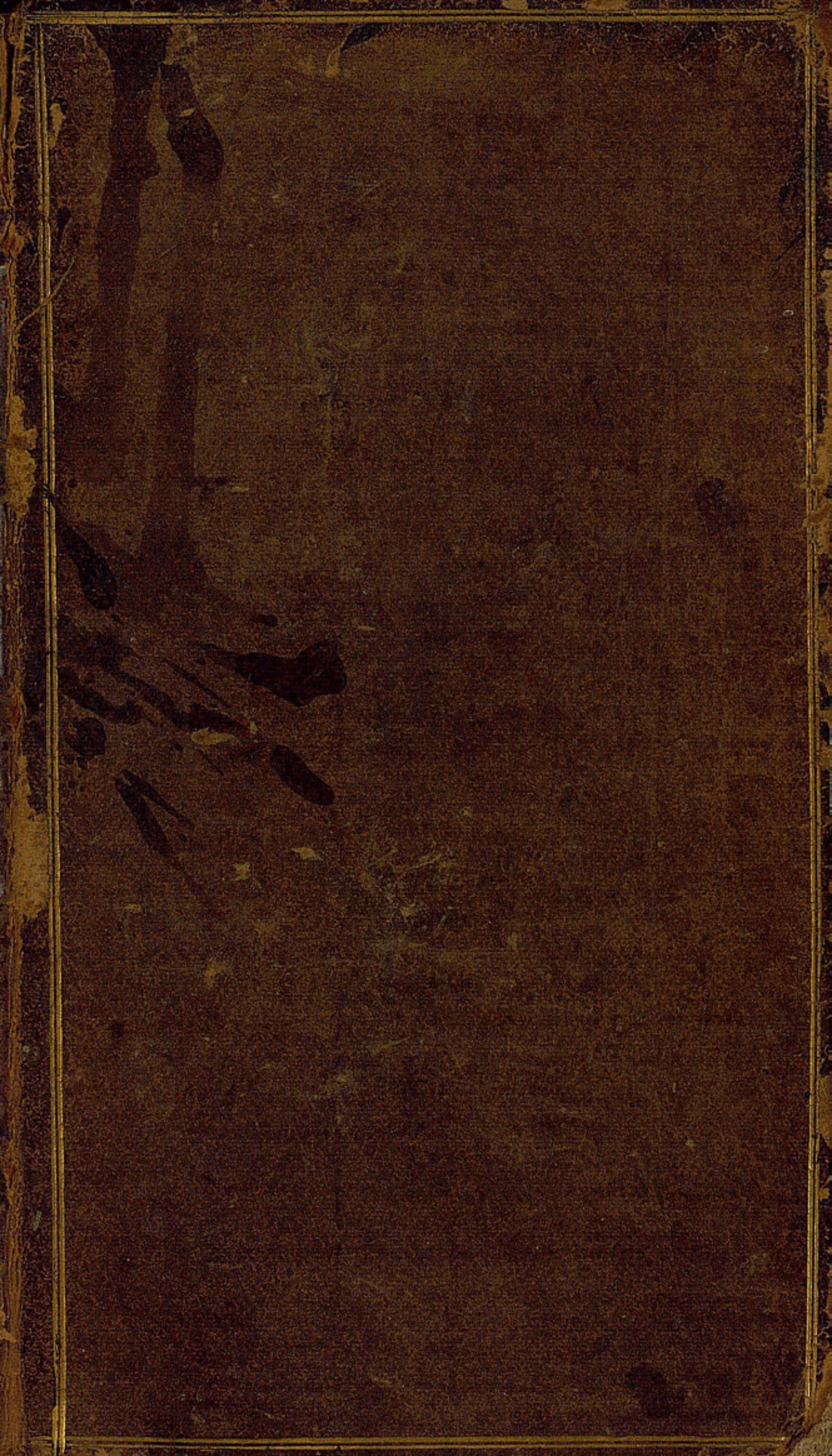

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URANOSCOPIA

Or, the Contemplation of the

HEAVENS, &c.

URANOSCOPIA:

OR, THE

Contemplation of the Heavens.

BEING A

Demonſtration of the Equation of Time:

With the

Method of obſerving the Solar Ingreſſes into any Point of the Ecliptic; and the Inveſtigation of the Aphelions, and Eccentricities of the Planets.

The Determination of the greateſt Elongation of VENUS and MERCURY from the SUN.

Of the Mean Motion of the Earth, her Aphelion, and the Receſſion of the Equinox; the SUN and MOON's True and Apparent Places, by Calculation and Obſervation: With the true Hour of the Night, by the STARS, perform'd by a New Quadrant.

Alſo, an Explanation and Demonſtration of the Keplerian and Flamſteedian Methods of Computing the Times, and principal Appearances of Solar Eclipſes. To which are added, New Tables of the Nonageſime Degree, its Altitude; the Moon's Parallax in Altitude, Longitude and Latitude. With many other things uſeful for ſuch a Work.

By CHARLES LEADBETTER, Teacher of the Mathematicks.

LONDON,

Printed for J. WILCOX, at *Virgil's Head*, againſt the New Church in the *Strand*. M.DCC.XXXV.



THE

INTRODUCTION.

READER,



Here preſent you with what I promiſed in the 418th Page of my *Compleat Syſtem of* ASTRONOMY; that is, the method of Computing the Latitudes and Longitudes of the Places of the Globe where the principal Apearances of Solar Eclipſes are Viſible.

And, as it was the Great *Kepler* that firſt made uſe of this method; ſo it was our Country-man Mr. *Flamſteed* that took it into conſideration and improved it: But becauſe the former wrote in *Latin*, and the latter giving but only one ſhort Example, and that Book is become ſcarce and conſequently dear, I have therefore in the following Sheets endeavoured to explain both their Methods in divers Examples.

And as the times of the Univerſal Eclipſes are firſt to be had before you can proceed to find where the principal Appearances are ſeen; theſe muſt be Learned from the 17th Precept of my forecited Book; in which you are to obſerve, that the time of the Ecliptic Conjunction, is always equal

equal to the time that the Sun is Centrally Eclipsed in the Nonagesime Degree; which you may the better understand by carefully tracing the following Calculations.

And as this Method of Projecting Solar Eclipses, and the Passage of the *Penumbra* over the Earth's Disk, I have sufficiently explain'd in the 419th Page of my SYSTEM; yet it will not be impertinent to acquaint the Reader (in this place) that, if we imagine a Plane to pass thro' the Center of the Earth, so that the Line which joyns the Centers of the Sun and Earth, may be perpendicular to this Plane, it will make on the Surface of the Earth a Circle, which will separate the illuminated Hemisphere of the Earth from the Dark.

This Circle is called the *illuminated Disk*; which Disk is directly seen by a Spectator placed at the distance of the Moon, in the right Line which joyns the Centers of the Sun and Earth.

Upon this Circle the Earth's Equator, its Parallels, Poles, and all other Circles which we imagine, are to be supposed Projected Orthographically: For all Lines drawn from the Center of the Sun to every single Point of the Disk being perpendicular to it, all the rest will be perpendicular to it; and then an Observer in the Moon will see all Countries, Cities, and Towns to move upon the Disk, which is occasioned by the Rotation of the Earth round its Axis from West to East: And every Point will have its way on the Disk: For by the Diurnal Gyration, all Places describe either the Equator, or one of its Parallels; and if the Sun be in the Plane of the Equinoctial, or rather if the Plane of the Equinoctial pass thro' the Sun, the

Equi-

Equinoctial and all its Parallels are in that case projected into Right Lines: For they will all be Perpendicular to the Disk, or Plane of the Projection.

But in other Positions of the Earth, or Sun, the Projection of these Circles will be Ellipses, which is the way that all the Places of the Earth are seen to move on the Disk.

Now, if thro' the Pole and the Sun there be a great Circle drawn which cuts the Earth, and this Circle be Projected on the Disk, it will be the Universal Meridian, (as in the three following general Schemes is Noted with ⊖ being the Earth's Axis.) To which, when any Place is observed to come, the Inhabitants of that Place will have Mid-day. And when any Place is seen to touch the Western Limb, or Edge of the Disk, the Inhabitants of that Place will then see the Sun rising to them; but a Spectator at the Moon will see the Place to rise and come upon the Disk, and will see it move towards the East: (because the Eye at the Moon is carried that way) and as soon as it has pass'd the Universal Meridian, the Place then being gone to the Eastward, the Sun seen out of the Earth from the place will apppear to move Westward. But when the place comes to the Eastern edge of the Disk, the Spectator in the Moon will observe the Place to set in the Disk; but the Inhabitants of that place upon the Earth's Surface will see the Sun to set in the West.

These being the chief Properties of this Projection, I shall hereunto subjoyn the twelve Propositions of *Theodosius*, which will give great light into the *Keplerian* Method.

PRO-

PROPOSITION I.

To those that inhabit under the North Pole, one and the same Hemisphere of the World is always apparent; but the other Hemisphere is always hidden: Nor do any Stars, either rise or set to them; but those that are in the upper Hemisphere are always conspicuous, and contrarily those in that, which is hidden, never appear.

II. To those People that inhabit under the Equinoctial Circle, all the Stars do rise and set; and are moved in equal time of 12 Hours above the Horizon, and under it.

III. In every Place within the Middle, or Torrid Zone, the Ecliptic Circle is at some certain time of the Day at right Angles to the Horizon of the Place: For the Circle parallel to the Equator, drawn thro' the *Vertex* or Zenith of the place, cuts the Ecliptic Circle in two Points. When therefore the Point of either Intersection is co-united with the Zenith, then the Ecliptic passes thro' the Poles of the Horizon; and therefore it cuts the Horizon at right Angles; and this is done twice in one Diurnal Revolution. But to those inhabiting under either Tropick, only once in a Day, that is, when the Solstitial Points in which the Ecliptic touches both the Tropicks come to the Zenith of that place. See the Table of the Altitude of the Nonagesime Degree. This is made Plain.

IV. To

IV. To those whose Zenith is as far distant from the Pole, as the Tropicks from the Equator, six Signs shall at once happen to rise, and six to set, in one Diurnal Revolution; that is, to those whose Zenith is in the Artic or Antartic Circle. For whereas the Poles of the Ecliptic are carried in the Peripheries of those Circles, therefore in one Diurnal Revolution the Pole is once co-united with the Zenith; that is, the Pole of the Ecliptic with the Pole of the Horizon; and therefore, the Ecliptic is also co-united with the Horizon. Which Co-union is made in an instant; and after that instant the Ecliptic is forthwith divided into two parts by the Horizon: So that in an instant one Semicircle of the Ecliptic rises, and the other Semicircle sets.

V. To those People inhabiting under the Equinoctical Circle, the Meridian shall cut above the Horizon the Semicircle of the Ecliptic into two equal parts, when the Points of Contact of the Tropicks and Ecliptic come to be in the Horizon; and then also the Ecliptic shall be at right Angles to the Horizon.

For, the Horizon then passing thro' the Poles of the Tropick, (the same with the Poles of the World) and the Points of the Contact of the Tropicks and Ecliptic shall (by the Laws of Sphericks) pass likewise thro' the Poles of the Ecliptic; and therefore shall cut the same at right Angles: And likewise the Ecliptic pass thro' the Poles of the Horizon, by which the Meridian also passes.

From whence the Arches, as well of the Meridian, as of the Ecliptic, intercepted between the Pole of the Horizon, and the Horizon, are Quadrants.

VI. To those Inhabiting under the Equinoctial, all Semicricles of the Ecliptic arise in equal time, as likewise do their opposite Peripheries.

For there, every Semicircle of the Ecliptic arises with the Diurnal Arch of its beginning; (but by the second hereof) all the Diurnal Arches are Semicircles, by which is manifest, the first part of this Proposition: The other part is clear, seeing not only the opposite Peripheries of the Ecliptic, but those likewise equally distant from the Equinoctial Points ascend, with equal Arches of the Equinoctial.

VII. To those People whose Horizon differ by a more Easterly Position, the Stars neither arise together, nor set together; but by how much sooner they arise to those who live more Easterly, by so much sooner do they set: For the Horizons of such equal Places, by reason of equal Altitude of the Pole, touch the same Parallel of the Equator; wherefore the Arch from any Parallel of the Semicircle of the Horizon interjected, as well between the places Eastward, as those Westward, are the same. Therefore every Star in a place Eastward by the same Arch, anticipates its rising, and thence its Setting, and consequently in the same interval of time.

VIII. To those inhabiting under the same Meridian, whatever Stars are between the greatest of the always apparent Parallels and the Equinoctial, appear longer above the Horizon to those inhabiting Northward, than they do to those inhabiting Southward.

And how much sooner they arise to those inhabiting Northward, so much later they set. But those Stars which are between the greatest of the Parallels always latent, (or hid) and the Equinoctial, appear longer above the Horizon, to those inhabiting Southward, than they do to those inhabating Northward; and how much sooner they rise to those inhabiting, so much later they set.

For to one travelling towards the apparent Pole, the Diurnal, increases; and to one going towards the Pole that is depressed, the Diurnal Arch of a Star, declining thitherward, increases likewise: But by Collating the Arches increasing on either side, that is to say, towards the East, or towards the West, the rest of the Proposition is manifest.

IX. But if the Horizons be neither under one Parallel, nor under the same Meridian, there will follow only an Inequality of the Arches raised above the Horizon, after the manner as before expressed; but no Anticipation of Risings or Settings. This, as the premised, is manifest by reason of the greater or lesser Inclination of the Horizon.

X. To those Inhabitants under either Pole, the Sun is carried constantly for six Months (nearly above the Horizon, and as long underneath it.

This appears by the firſt Propoſition, ſince one half of the Ecliptic is always apparent, and the other always latent; either of which by the Sun (apparently) in near about ſix Months time, is run through.

XI. To thoſe going from the Pole towards the Artic or Antartic Circles, this conſtant Stay of the Sun either above or under the Horizon, for ſix Months, grows leſſer and leſſer, until it be reduced to the ſpace of 24 Hours, either under the Artic or Antartic Circle: For, the Horizon of thoſe Habitations, touch two Parallels of the Equator greater than the Tropicks, which on either ſide cut from the Eliptic two equal Peripheries; and that Periphery which the Parallels always cuts off, never ſets, and that which is always latent, never riſes. Latent, always ſignifies *hid*.

To thoſe inhabiting under the Artic or Antartic Circles, the longeſt Day is 24 Hours, and the Night but an inſtant; on the contrary, the longeſt Night 24 Hours, and the Day but an inſtant.

The other Arks increaſe and decreaſe until they come to the Equality of the Equinox.

THE
CONTENTS.

How

ADVERTISEMENT.

ERRATA.

E R R A T A.

PAge 34, for *Sum*, read *Sun*; p. 55, Line *ult.* r. *half*; p. 60. l. 9, for 22, r. 23; p. 64, l. 12, for 549, r. 459; p. 77, l. 22, fot 36, r. 35; p. 90, l. 4, r. for 1724, r. 1734; and under *Apog.* for 3^{s}, r. 8; p. 118, l. *ult.* r. *Sign* 11; and for 14, r. 4; p. 120, l. *ult.* for 5, r., 4 and 3 *Sign* under 9, for *Page* 86, r. 186; p. 281, l. 36, for *Gard*, r. *Card*; p 304, before 6, under the black Line. CHAP. 22; p. 552, l. 4, for *Parallox* r. *Parallax*.



URANOSCOPIA.

CHAP. I.

A Demonſtration of the Equation of Time.

BEING now upon the Buſineſs of Demonſtrating my Aſtronomical Obſervations, it will not be improper to ſpeak ſomething of the Inequality of Natural Days: For without a right underſtanding in that, the Aſtronomer will be at a loſs to regulate his curious Time-keeper, and thereby make wrong Obſervation. This is a Matter that has exercis'd the Thoughts of Aſtronomers in all Ages: And tho' all have allow'd, that there really is ſuch an Inequality, yet they have much diſagreed in aſſigning its Quantity, and demonſtrating the Reaſon and Affection thereof; becauſe they all built upon a wrong Hypotheſis, ſuppoſing the Earth at reſt; which produced them but one part of the Equation of Natural Days: And with this they ſatisfied themſelves, not thinking but that they then had the whole, whereas they had only one half.

Thus, the Equation of Time, which depends upon the Obliquity of the Ecliptic, was made uſe of till about the Middle of the laſt Century, when our Country-Man *Street*, in his Ephemeris for the Year 1655, gave a little Sketch of its Demonſtration, which he afterwards put in his *A-*

ſtronomia Carolina, with Tables of the Equation of Time, in Two Parts; where he groſsly miſtakes the Second Part, and bids us to Add, when we ſhould Subtract, *& contrà*; leaving the Second Part without any Demonſtration at all; till at laſt, our moſt Learned Aſtronomer Mr. *Flamſteed*, has determin'd the Controverſy, and by moſt evident Demonſtrations Geometrical has put the matter beyond further Diſpute, clearly evincing both the Reaſons, Affections, and Quantity of this Inequality. His Diſſertation concerning this, is annex'd, and publiſh'd at the End of the *Opera Poſthuma Jeremiæ Horroxcii*, *Lond.* 1673, 4*to.* to which I refer my Reader.

Let us now, with Dr. *Keill*, ask who they are that dare tell us, that the Sun doth not tell the Truth? The Aſtronomers are the bold Men that tell us ſo: For they, by their nice Search into Things, have found, that the Sun's apparent Motion is no ways equal: They obſerve, that he now and then ſlackens his pace, and afterwards quickens it again: And therefore Equal Time, which goes on always at the ſame rate, cannot truly be meaſur'd by the Sun's Motion. *Keill, Lect.* Page 313. Aſtronomers have diſtinguiſh'd the Days into Civil and Natural.

1. A Civil Day being that Space of Time containing juſt twenty four Hours, reckon'd from Twelve of the Clock at Noon on one day, unto Twelve of the Clock at Noon on the next day; in which time the Equinoctial makes one entire Revolution about the Axis of the World.

2. The Natural, or Apparent Day, is that Space of Time, in which the Sun moves from the Meridian of one Place, to the ſame Meridian again. Theſe Days are not always of an equal Length; but are longer at ſome times of the Year than at other times. The difference between theſe two ſorts of Days is but ſmall; and there is a double Cauſe for this ſmall Inequality.

All Aſtronomical Time begins at the Noon of one day, and ends at Noon on the next following day; and this agrees with the *Natural Day* above-mention'd.

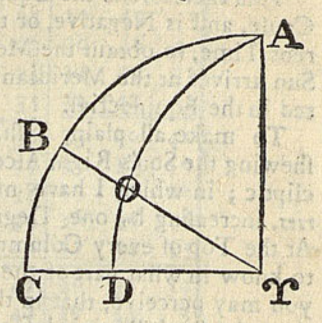
This has alſo two Demonſtrations, *viz.* Equal and Apparent.

The Equal Time is that which is kept by an equal Motion in the Equinoctial; to which Time all Aſtronomical Tables are exhibited.

The

The Apparent Motion, or Time Apparent, is the ſenſible or external Meaſure, eſtimated by the Sun's Apparent unequal Motion in the Ecliptic; to which, all Calculations Aſtronomical muſt be reduced.

In this adjacent *Diagram*, let A B C be a Quadrant of the Solſtitial Colure, A the Pole, ♈ C a Radius of the Equinoctial, ♈ B a Radius of the Ecliptic, ♈ the Equinoctial Point, or the Place of the Sun in the Beginning of it at Noon on ſome certain day, ☉ the Sun's Place at Noon the day following; through which Place ſtrike the Arch A ☉ *D*, to cut the Equinoctial at Right Angles in *D*: ♈ ☉ will expreſs the diurnal Motion of the Sun, and ♈ *D* its Right Aſcenſion, or the Equinoctial that culminates with the Sun: which Arch, ſeeing it is one of the Sides of a Right-angled Spheric Triangle ♈ *D* ☉, cannot be equal to the Hypothenuſe, that is, to the Sun's Motion ♈ ☉.



Wherefore ſeeing the Revolutions of the Equinoctial, and of its equal or like Parts, are equable, and performed in equal times; but the Sun, in paſſing equal Parts of the Ecliptic, apply to the Meridian with unequal Parts of the Equinoctial; it neceſſarily follows, that the Solar Days are unequal.

And that the difference between the Sun's true Place and its Right Aſcenſion, being converted into Time, is the true Equation of Time ariſing from this Cauſe. Which Equation in the firſt and third Quadrants of the Ecliptic is to be ſubtracted from the Apparent Time: For in them the Longitude of the Sun from the next Equinoctial Point paſſes the Meridian ſooner than a like Arch projected in the Equinoctial. But in the ſecond and fourth Quadrants of the Ecliptic, this Equation is to be added to the Apparent Time to get the Mean; for in theſe the Longitude of the Sun from the Equinoctial Point *Libra* paſſes the Meridian later than the like Arch projected in the Equator.

For Example: Let the Longitude of the Sun from the Equinoctial Point ♈ be ♈ ☉ = 59′ 8″, its Right Aſcenſion, or the Arch of the Equinoctial culminating therewith will

be ♈ D 54′ 14″, being less than ♈ ☉ by 4′ 54″; which being turned into Time (by the Table, Page 66, of my Astronomy) is 19″ 36‴; and by so much is the Apparent Day shorter than the Mean.

This therefore is the Equation of Time arising from this Cause, and is Negative, or to be subtracted from the Apparent Time, to obtain the Mean Time: For the Longitude of Sun arrives at the Meridian sooner than a like Arch projected in the Equinoctial.

To make all plain, I shall annex the following Table, shewing the Sun's Right Ascension to every Degree of the Ecliptic; in which I have number'd the Sun's Place from *Aries*, increasing by one Degree round the Ecliptic, to 360°. At the Top of every Column I have set the Signs, for a Guide to know in what part of the Ecliptic the Sun is: By which you may perceive, that in the first Quadrant, that is, all the time the Sun's Place is less than 90°, the Sun's Place exceeds the Right Ascension; but in the second Quadrant, that is, while he is moving from *Cancer* to *Libra*, his Place being less than 180°, the Right Ascension is more than the Sun's Place. In the third Quadrant, the Longitude is again greater than the Right Ascension; but in the 4th or last Quadrant it is again less, as in the second.

Now it is from this Table that I constructed that in Page 2, of my Astronomy. Thus, let the Sun be one Degree in *Aries*, his Right Ascension is 55′ 4″; which subtracted from 1°, leaves 4′ 58″; which turned into Time, is 19″ 52‴. Now because I omit Thirds in that Table, therefore I call 19″ 52‴ : 20″, which is the first Number in that Table of the first Part of the Equation of Time, to be added to the Equal, or subtracted from the Apparent Time. Again, let the Sun be in 15° *Taurus*; that is, 45° from the beginning of *Aries*, and his Right Ascension is 42° 31′ 34″; this difference is 2° 28′ 26″; which reduced into Time, is 9′ 53″ 44‴, to be added to the Equal, or subtracted from the Apparent Time, as that Table directs, which was constructed from this, after the manner now directed.

Sun's

Sun's Place		R. Ascension °	′	″	Sun's Place		R. Ascension °	′	″
♈	1	0	55	2	♉	31	28	51	32
	2	1	50	4		32	29	49	3
	3	2	45	7		33	30	46	44
	4	3	40	10		34	31	44	33
	3	4	35	15		35	32	42	32
	6	5	30	22		36	33	40	41
	7	6	25	31		37	34	38	59
	8	7	20	42		38	35	37	28
	9	8	15	55		39	36	36	6
	10	9	11	11		40	37	34	55
	11	10	6	30		41	38	33	54
	12	11	1	53		42	39	33	3
	13	11	57	20		43	40	32	22
	14	12	52	51		44	41	31	53
	15	13	48	26		45	42	31	34
	16	14	44	6		46	43	31	26
	17	15	39	51		47	44	31	29
	18	16	35	40		48	45	31	43
	19	17	31	35		49	46	32	7
	20	18	27	36		50	47	32	43
	21	19	23	44		51	48	33	30
	22	20	19	58		52	49	34	28
	23	21	16	18		53	50	35	36
	24	22	12	46		54	51	36	55
	25	23	9	20		55	52	38	25
	26	24	6	2		56	53	40	6
	27	25	2	52		57	54	41	58
	28	25	59	49		58	55	44	0
	29	26	56	55		59	56	46	13
	30	27	54	19		60	57	48	36

Sun's Place	R. Ascension °	′	″	Sun's Place	R. Ascension °	′	″
♊ 61	58	51	9	♋ 91	91	5	25
62	59	53	52	92	92	10	50
63	60	56	46	93	93	16	14
64	61	59	49	94	94	21	36
65	63	3	1	95	95	26	56
66	64	6	23	96	96	32	15
67	65	9	54	97	97	37	30
68	66	13	33	98	98	42	43
69	67	17	21	99	99	47	52
70	68	21	18	100	100	52	57
71	69	25	22	101	101	57	57
72	70	29	33	102	103	2	53
73	71	33	53	103	104	7	44
74	72	38	19	104	105	12	29
75	73	42	52	105	106	17	8
76	74	47	31	106	107	21	21
77	75	52	16	107	108	26	7
78	76	57	7	108	109	30	27
79	78	2	3	109	110	34	38
80	79	7	3	110	111	38	42
81	80	12	8	111	112	42	39
82	81	17	17	112	113	46	27
83	82	22	30	113	114	50	6
84	83	27	45	114	115	53	37
85	84	33	4	115	116	56	59
86	85	38	24	116	118	0	11
87	86	43	46	117	119	3	14
88	87	49	10	118	120	6	8
89	88	54	35	119	121	8	51
90	90	00	00	120	122	11	24

Sun's Place	R. Ascension °	′	″	Sun's Place.	R. Ascension °	′	″
♌ 121	123	13	47	♍ 151	153	3	5
122	124	16	0	152	154	0	11
123	125	18	2	153	154	57	8
124	126	19	54	154	155	53	58
125	127	21	35	155	156	50	40
126	128	23	5	156	157	47	14
127	129	24	24	157	158	43	42
128	130	25	32	158	159	40	2
129	131	26	30	159	160	36	16
130	132	27	17	160	161	32	24
131	133	27	53	161	162	28	25
132	134	28	17	162	163	24	20
133	135	28	31	163	164	20	9
134	136	28	34	164	165	15	54
135	137	28	29	165	166	11	34
136	138	28	7	166	167	7	9
137	139	27	38	167	168	2	40
138	140	26	57	168	168	58	7
139	141	26	6	179	169	53	30
140	142	25	5	170	170	48	49
141	143	23	54	171	171	44	5
142	144	22	32	172	172	39	18
143	145	21	1	173	173	34	29
144	146	19	19	174	174	29	38
145	147	17	28	175	175	24	45
146	148	15	27	176	176	19	50
147	149	13	16	177	177	14	53
148	150	10	57	178	178	9	56
149	151	8	28	179	179	4	58
150	152	5	51	180	180	0	0

Sun's Place	R. Ascension. °	′	″	Sun's Place	R. Ascension. °	′	″
♎ 181	180	55	2	♏ 211	208	51	32
182	181	50	4	212	209	49	3
183	182	45	7	213	210	46	44
184	183	40	10	214	211	44	33
185	184	35	15	215	212	42	32
186	185	30	22	216	213	40	41
187	186	25	31	217	214	38	59
188	187	20	42	218	215	37	28
189	188	15	55	219	216	36	6
190	189	11	11	220	217	34	55
191	190	6	30	221	218	33	54
192	191	1	53	222	219	33	3
193	191	57	20	223	220	32	22
194	192	52	51	224	221	31	53
195	193	48	26	225	222	31	24
196	194	44	6	226	223	31	26
197	195	39	51	227	224	31	29
198	196	35	40	228	225	31	43
199	197	31	35	229	226	32	7
200	198	27	36	230	227	32	43
201	199	23	44	231	228	33	30
202	200	19	58	232	229	34	28
203	201	16	18	233	230	35	36
204	202	12	46	234	231	36	55
205	203	9	20	235	232	38	25
206	204	6	2	236	233	40	6
207	205	2	52	237	234	41	58
208	205	59	49	238	235	44	0
209	206	56	55	239	236	46	16
210	207	54	9	240	237	48	36

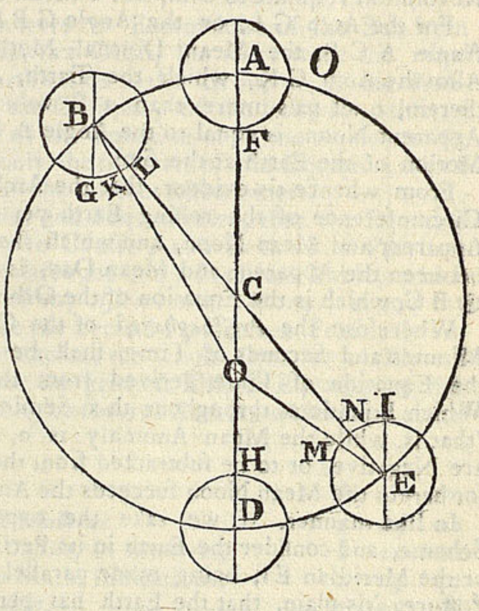
Sun's Place.	R. Ascension. °	′	″	Sun's Place.	R. Ascension. °	′	″
♐241	238	51	9	♑271	271	5	25
242	239	53	52	272	272	10	50
243	240	56	36	273	273	16	14
244	241	59	49	274	274	21	36
245	243	3	1	275	275	26	56
246	244	6	23	276	276	32	15
247	245	9	54	277	277	37	30
248	246	13	33	278	278	42	43
249	247	17	21	279	279	47	52
250	248	21	18	280	280	52	57
251	249	25	22	281	281	57	57
252	250	29	33	282	283	2	53
253	251	33	53	283	284	7	44
254	252	38	19	284	285	12	29
255	253	42	52	285	286	17	8
256	254	47	31	286	287	21	21
257	255	52	16	287	288	26	7
258	256	57	7	288	289	30	27
259	258	2	3	289	290	34	38
260	159	7	3	290	291	38	42
261	260	12	8	291	392	42	39
262	261	17	17	292	292	46	27
263	262	22	30	293	294	50	6
264	263	27	45	294	295	53	37
265	264	33	4	295	296	56	59
266	265	38	24	296	298	0	11
267	266	43	46	297	299	3	14
268	267	49	10	298	300	6	8
269	268	54	35	299	301	8	51
270	270	0	0	300	3 2	11	24

Sun's Place.	R. Ascension. °	′	″	Sun's Place.	R. Ascension. °	′	″
♒301	303	13	47	♓331	333	3	5
302	304	16	0	332	334	0	11
303	305	18	2	333	334	57	8
304	306	19	54	334	335	53	58
305	307	21	35	335	336	50	30
306	308	23	5	336	337	47	14
307	309	24	24	337	338	43	42
308	310	25	32	338	339	40	2
309	311	26	30	339	340	36	16
310	312	27	17	340	341	32	24
311	313	27	53	341	342	28	25
312	314	28	17	342	343	24	20
313	315	28	31	343	344	20	9
314	316	28	34	344	345	15	54
315	317	28	26	345	346	11	34
316	318	28	7	346	347	7	9
317	319	27	38	347	348	2	40
318	320	26	57	348	348	58	7
319	321	26	6	349	349	53	30
320	322	25	5	350	350	48	49
321	323	23	54	351	351	44	5
322	324	22	32	352	352	39	18
323	325	21	1	353	353	34	29
324	326	19	19	354	354	29	38
325	327	17	28	355	355	24	45
326	328	15	27	356	356	19	50
327	329	13	16	357	357	14	53
328	330	10	57	358	358	9	56
329	331	8	27	359	359	4	58
330	332	5	51	360	360	0	0

On

On account of the Sun's Eccentricity, C ☉ 1692, from the Center of the Earth's Annual Orbit, the Diurnal Motion of the Earth is ſometimes faſter, and ſometimes ſlower than the Mean Motion 59′ 8″; and conſequently the Apparent Day is ſometimes longer, and ſometimes ſhorter than the Mean Day: Which Inequality, and the quantity of the Difference of the Equal or Mean Day from the Apparent, is thus demonſtrated:

In the following Figure, let A B D E be the Great Orb, in which the Earth is yearly carried about the Sun; the Center hereof is C, A, the Aphelion, or the Earth's Place at Noon on that Day that it is in its Aphelion, ſuppoſe the 18th of *June*, B the Earth's Place at Noon the following Day; A F an aſſigned Meridian of the Earth; the Arch A B, or the Angle A C B; the Mean Motion of the Earth 59′ 8″ from the Noon of the given Day, to the Noon of the Day following; F a Point in the given Meridian turn'd to the Sun; which Point while the Earth is carried in its Orb from A to B, is roll'd by the diurnal Circumvolution of the Earth from F thro' O the firſt Day, to G the ſecond Day; to which Place when the ſaid Point arrives, 'tis manifeſt that the Earth has perform'd a Compleat Revolution about its own Axis; becauſe the Meridian B G,



in the ſecond Day's Poſture, is made parallel to A F, its firſt Day's Poſture: But it is not yet apparent Noon, till the ſame Point of the Earth, by its Revolution be brought to K, where

where 'tis turn'd directly to the Sun, who governs the Civil Days.

And that this time is not the same with the Celestial or Equal Noon, will be prov'd, not only because the Earth has not yet performed its Mean Motion above its Revolution (tho' this were a sufficient Argument,) but also because the diurnal Motions about the Sun, and consequently the Returns of any certain Meridian to him, are very unequal: Neither can that possibly be equal, in respect of any Point, about which the Earth is carried equally; as is sufficiently manifest from the Inspection of the Scheme only. Wherefore the Mean Noon and Equal Time respect the Point of the Mean Motion, (that is, the Center of the Orbit at C) and in our present Instance, is then, when the Meridian carried from K, arrives at L, where it is directly turn'd to the Center of the Orbit at C. And when it has gained this Posture, the Earth has performed its Mean Motion above a Revolution requisite to compleat a Mean Day.

For the Arch G L, or the Angle G B L is equal to the Angle A C B, the Mean Diurnal Motion of the Earth. Also the Arch G K, which the Earth, or any Meridian therein, must pass more than a Revolution, before it be Apparent Noon, is equal to the Angle A ☉ B, the Apparent Motion of the Earth at the Sun.

From whence tis evident, that the Arch K L, which the Circumference of the rolling Earth performs between the Apparent and Mean Noon, and which shews the Difference between the Apparent and Mean Day, is equal to the Angle ☉ B C, which is the Equation of the Orbit.

Wherefore the *Prosthaphæresi* of the Orbit reduced into Minutes and Seconds of Time, shall be the second part of the Equation of Time derived from the Earth's Motion. Which Equations throughout this Semicircle of the Orbit (that is, while the Mean Anomaly is 0, 1, 2, 3, 4, 5 Signs) are Negative, or to be subtracted from the Apparent Time; for herein the Mean Noon succeeds the Apparent.

In like manner, if we take the opposite Place of the Scheme, and consider the Earth in its Perihelion, the Point I, or the Meridian E I, being made parallel to its Yesterday's Posture, 'tis plain, that the Earth has performed one compleat Revolution.

This Point being carried to N, where 'tis turned to the Center of the Orbit, 'tis now Mean Noon: For the Arch N I, or the Angle N E I, equal to the mean diurnal Motion

of

of the Earth, is passed over. But it is not yet Apparent Noon, till the Earth, by its Rotation, brings the same Meridian to M, where it is directly turned towards the Sun. From whence 'tis manifest, that the Apparent Day exceeds the Mean by so much time as is requisite for the Earth to pass the Arch N M; which Arch is equal to the Angle C N ☉, the *Prosthaphæresis* of the Orbit. Wherefore reducing this into Time, gives the Equation of Natural Days, in respect of the Earth's Motion, which throughout this Semicircle of Anomaly (*i. e.* while the Earth moves from her Perihelion to her Aphelion) is Affirmative, or to be added to the Apparent Time; because herein the Mean Noon precedes the Apparent.

'Tis manifest, from what goes before, that if the Sun were in the Center of the Earth's Annual Orbit, and the Earth's Axis were not inclin'd to its Path, or Way, there would be no Inequality of Time; but the Mean Day and Apparent would be equal.

Moreover, if there were no Eccentricity of the Sun from the Center of the Earth's Orbit, but there were the usual Inclination of the Earth's Axis to the Orbit, or, as the *Ptolemaicks* do express it, the Obliquity of the Ecliptic; then, I say, this second part of the Equation of Time would vanish, and there would be only the first part of the Equation, which was only retain'd by all the ancient Astronomers.

I having now shewn, and demonstrated, that the Equation of Time depends on two Causes; and in the First Part having fully finish'd, and brought into a Practical Table, which you have in Page 2, of my *Astronomical Tables*; it is now my next business to reduce the Second Part into a Practical Table also, which will compleat the whole Equation of Time.

But first, I shall shew the greatest Elliptic Equation of the Earth's Orbit, according to several Authors which are come to hand.

	°	′	″
Ptolemy, Claudius in *Mullerus*	2	23	00
Alphonsus, King of *Castile*, in *Mullerus*,	2	10	00
John Newton, in his Math. Institutions.	2	04	47
John Kepler, *Rudolphin*, — —	2	03	46
Natalis Duret — — —	2	03	46
William Leyburn, in his *Cursus Mathem.*	2	03	42
Tycho Brahe, — — ---	2	03	15
Johannes Maginis, in his *Ephemerides*,	2	03	12

Ed-

	°	′	″
Edward Wright, in his Errors of Navigation,	2	03	08
V. Wing's Hermonicon Instr. & Brit.	2	02	56
Bullialdus, — — —	2	02	41
Jer. Shakerly, — — —	2	02	41
J. Gadbury from *ditto*, — —	2	02	41
J. Newton' Decimal Tables, —	2	02	40
T. Street, --- --- ---	1	59	06
N. *Greenwood* from *ditto*, ----	1	59	06
Jeremy Horrox, — ---	1	59	00
J. Wing in his *Scientia Stellarum*,	1	57	30
William Leybourn in his Institutions,	1	57	00
Sir *Isaac Newton* in his Theory of the Moon,	1	56	20
Mr. *Whiston* in his Lectures, - --	1	56	20
Mr. *Hodgson* in his System, ----	1	56	20
My Tables, in my System, ----	1	56	20
P. H. Le la Hire, --- ----	1	55	42
Mr. *John Flamsteed*, ---- ---	1	55	00
N. Copernicus in *Mullerus*, ----	1	50	41

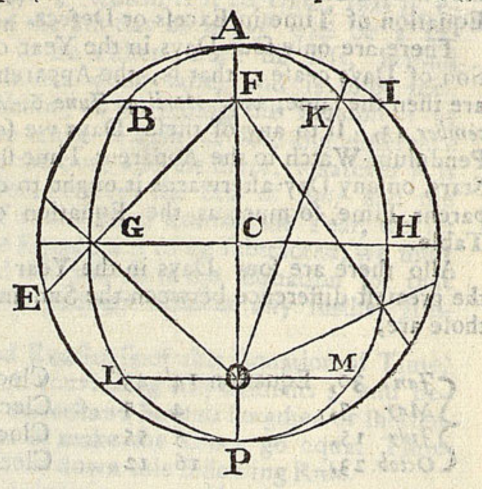
By which it will appear, that if those ancient Astronomers had had any Notion of the Earth's Motion, they might have prov'd their Tables by the going of a good Pendulum-Clock: For *Ptolemy*'s greatest Equation turned into Time, is 9′ 32″, which is 1′ 47″ too much; and *Copernicus* is 22″ 36‴ too little. The greatest Elliptic Equation in my Tables is found thus:

As G ⊙ Mean Dist. ⊖ à ⊙	100000	5.000000
To Radius ---	90° 0′	10.000000
So C ⊙ Eccentricity	1692,	3.228400
To S. ∠ C G ⊙	58′ 10″	8.228400

Doubled, is = ∠ F G ⊙ 1° 56 20; which subtract in the first Semi-circle, and add in the second, as is plain in the following Figure.

But

But in any other part of the Orb, it will require a further Calculation to find the Mean & True Anomalies (which shall be shewn in its proper place) whose difference is the Elliptic Equation, and makes up the Table in Pages 28, 29, and 30, of my *Astronomy*; which Table being reduced into Time, are the Numbers in Page 3, of my *Astronomy*, and is what is called the Second



Part of the Equation of Time, depending on the Sun's Eccentricity: And this answers to every Degree of Mean Anomaly, whose Use you will find in *Precept* 2, Page 339, of my *System*.

Here are therefore demonstrated two sorts of Equation of Time, arising from two different Causes: If they are both to be added, or both to be subtracted, their Sum is to be added or subtracted; but if one be to be added, and t'other subtracted, their difference, according to the nature of the greatest, is to be added or subtracted to or from the Apparent to get the Mean.

After clearing the Theory of this Doctrine, I come next to apply it to Practice, in regulating curious Time-keepers; which indeed are very often abused, for want of the due Consideration and right Application of this Equation of Time. For at some times of the Year it happens, that if our Watches, or oscillating Pendulums do not differ above a quarter of an Hour from the Time shew'd by the Sun or Stars, they are false, and need a Correction. And the reason of this is plain: For if a Pendulum-Watch goes true, it goes equal; that is, one twenty four Hours at any time of the Year, is as long as another twenty four Hours at any other time of the Year, and this perpetually and constantly: That is, all Watches that go true, measure the Equal or Mean Time, and consequently differ from the Apparent Time shewn

ſhewn by a Sun-Dial or other Inſtrument, as much as is the Equation of Time in Exceſs or Defect.

There are only four Days in the Year on which the Equation of Days ceaſe; that is, the Apparent and Mean Time are then the ſame, *viz.* *April* 4, *June* 6, *Auguſt* 20, and *December* 13. If to any of theſe Days we ſet a well regulated Pendulum-Watch to the Apparent Time ſhewn by the Sun or Stars, on any Day afterwards it ought to differ from this Apparent Time, ſo much as the Equation of Time is in the Table.

Alſo there are four Days in the Year in which there are the greateſt difference between the Sun and the Clock; and thoſe are,

Jan. 30,	Equation	14′	49″	Clocks too faſt.
May 3,		4	5	Clocks too ſlow.
July 15,		5	55	Clocks too faſt.
Octob. 23,		16	12	Clocks too ſlow.

By which it appears, that from *April* 4, to *June* 6, the Equation muſt be added to the Equal Time, to give the Apparent; from *Auguſt* 20, to *December* 13, the Equation is again added to the Equal Time, to gain the Apparent; but from *December* 13, to *April* 4, it is to be ſubtracted. But if you would reduce the Apparent Time to the Equal, you muſt uſe the contrary Titles; that is, now ſubtract, where you there added. Therefore in regulating curious Time-keepers for Aſtronomical uſe, you moſt always obſerve, that they differ from the Time obſerved by the Sun or Stars, ſo much as is the Equation of Time for that Day. As, ſuppoſe *July* 8, the Equation is 5′ 40″ Clocks too faſt; therefore this Equation is to be ſubtracted from the Time ſhewn by the Sun or Stars: But if the ſame Equation be added to the Apparent Time ſhewn by the Sun, the Sum will be the Equal Time ſhewn by the Clock.

Wherefore if at any time we ſet our Pendulum-Watch, in order to rectifie it, and bring it exactly to meaſure the Mean Day, we are to add or ſubtract from the Apparent Time ſhewn by the Sun, ſo much as is the Equation of Days at the time we ſet it.

For Example; at Noon, or juſt when the Sun is on the Meridian, that is, when the Apparent Time is exactly 12 a-Clock the 8th Day of *July* I ſet my Watch, the Equation is then 5′ 40″ add to the Apparent Time: Wherefore I ſet my

my Watch to 12 h, 5′ 40″; which, if it go right, that is, equally, as it ought, on the 8th day of *August* will be 3′ 13″ before the Sun: If it be either more or less, behind or before the Sun, it has gone false, and is to be rectified, either by lengthening or shortening the Pendulum as much as is requisite to make it gain or lose the difference between 3′ 13″ before the Sun, and its Error, whatever it is in 31 Days time elapsed, between the 8th of *July* and the 8th of *August*. But if at any other time of the Year, we set our Watches when the Equation is to be subtracted, we must put it so much behind the Sun as is the Equation for that Day. But this is plain enough without any further Illustration.

Of the Certainty and Exactness of this Equation of Time, I have made many most convincing Experiments; and because it is necessary to understand how to lengthen or shorten the Pendulum, in order to make the Clock go equal Time the Year round, I shall lay down this following Rule.

The Lengths of Pendulums are to each other reciprocally as the Squares of their Vibrations in the same time.

Thus, if a Pendulum 39.2 Inches long vibrates 60 times in a Minute, how oft will a Pendulum 9.8, (*viz.* a quarter of 39.2) Inches vibrates in a Minute?

As the Length of the shortest Pendulum 9.8,
To the Length of the other Pendulum;
So are 3600, the Seconds in a Minute, to a Fourth Number, whose Square Root are the Vibrations in a Minute of the shorter Pendulum.

OPERATION.

```
                  60'
Length P.         60     Length Pend.
                 ------
As 9.8           3600 : :   39.2
                            3600
                          --------
                           235200
                          1176
                          ------------
                    9.8) 141120.0 (14400 (120"
                         ....:  1
                         98      -----
                        -------  22) 44
                         431        44
                         392       -------
                        -------      00
                           00
```

Answer. 120 Vibrations in a Minute, of that Pendulum whose Length is 9.8.

Secondly, If it be demanded, how oft a Pendulum 43.5 Inches long vibrates in a Minute, the Analogy is this:

```
  Pend.      "     Pend.
As 43.5 : 3600 : : 39.2
                  3600
             -----------
             235200
            1176
            -----------
   43.5) 1411200 (3244 (57" fere.
              ....  25
            1305
            ------   ------
             1062  107(744
              870    749
            ------   ------
             1920
             1740
            ------
             1800
             1740
            ------
               60
```

And

And ſeeing each Vibration of the Pendulum in a Clock adapted for it, ſets the Hand forward a Second, by knowing the Number of Vibrations which a Pendulum 43.5 Inches long performs in a Day leſs than a Pendulum 39.2 Inches long, we may know the Number of Seconds which it will ſlacken the Index of the Clock leſs than 39.2 Inches long.

Contrarily, Let it be required, to find the Length of a Pendulum, which ſhall make any aſſign'd Number of Vibrations in a Minute?

As for Example: Let the Number of Vibrations be 57; Length of a String counted from the Point of the Suſpenſion, to the Center of Oſcillation, or of the Bullet or round Ball at the End of it, is required?

Since the Lengths of Pendulums are to each other as the Squares of their Vibrations; therefore it will hold, As the Square of the Number of Vibrations, are to the Length of the Pendulnm 39.2, which vibrates Seconds; So is theSquare of 60, the Seconds in a Minute, To the Length of the Pendulum requir'd.

OPERATION.

```
  57      60
  57
 ----     60
 399    -------
285

 ---- P.
As 3249 : 39.2 : : 3600
             3600
           ------
           235200
          1176
       ------------
3249) 141120.0 (43.4 Inches, Length of Pend. req'd.
          . . .
         12996
```

What I have given on this Head, may be of excellent uſe, both to Regulate the Motion of a Clock or Watch, and exactly to meaſure Time without either; which may

gratifie and affift the curious Aftronomer in obferving Eclipfes, efpecially thofe of the Satellites of *Jupiter*, and in the Tranfits of the Moon under the Fixed Stars, and her Occultations of them, whofe Duration may be meafured, without Clock, Watch, or any fuch Way of diftinguifhing Time.

And here let the Reader obferve, that Pendulums of the fame Length do not, in different Places on the Globe, make their Vibrations in the fame time; but towards the Poles, where the Gravity is ftrongeft, they move quicker than near the Equator, where they are lefs impelled to the Center: And accordingly, Pendulums that meafure the fame Time by their Vibrations, muft be fhorter near the Poles, than at a greater diftance. Both which Deductions are found to be true in fact; of which Sir *Ifaac Newton* has recounted particularly feveral Experiments; in which it was found, that Clocks exacted, adjufted to the true Meafure of Time at *Paris*, when tranfported nearer to the Equator, became erroneous, and mov'd too flow; but were reduced to their true Motion, by contracting their Pendulums.

Sir *Ifaac* was particular, in remarking how much they loft of their Motion, while the Pendulums remain'd unalterable; and what Length the Obfervers are faid to have fhortned them, to bring them to Time.

And the Experiments which appear to be moft carefully made, fhew the Earth to be raifed in the Middle between the Poles about feventeen Miles, which is caufed by its Rotation upon its own Axis.

CHAP.

CHAP. II.

How to observe the Sun's Ingress into any Point of the Ecliptic.

FOR this purpose you must be provided with an exquisite Astronomical Quadrant; by which you may take an Altitude to Seconds; and from that you must truly determine the Elevation of the Pole at the Place of your Habitation. Then take the Sun's Meridional Altitude on the Day you think the Sun may be near that Point of the Ecliptic which you are seeking; and also on the Day following, if possible, or as soon as you can, take his Meridional Altitude a second time; and by these two Meridional Altitudes you will discover whether he is short, or past the Point of the Ecliptic which you are seeking. By these two Meridional Altitudes, and the Latitude of the Place of Observation, you may find the Sun's Declination, and consequently his true Longitude, answering, as I have taught in my *Compleat System of Astronomy.* Then, if one Altitude be short, and the other past the Point of the Ecliptic sought, add the two Places agreeing to those Altitudes, together, and say, As the Sum of those two Longitudes, or Distance of the Sun from the Point of the Ecliptic sought, Is to the Space of Time between the Two Observations; So is the Distance of the Sun from the Point of the Ecliptic sought, To a proportional Part of the Time; which added to the Time of the First Observation, will give the Time the Sun is in the Point of the Ecliptic sought.

But if the Observations are both taken when the Sun is either short, or past the Point of the Ecliptic, then, instead of the Sum of the Sun's Longitudes, you must take the Difference, and say as before: And if the Declination at the time of the first Observation be less than the Declination of time of the second Observation, the proportional part of the time must be subtracted from the time of the firrst Observation. But if the Declination at the time of the first Observation be more than the Declination at the time of the second Observation, then the propor-

tional part of time muſt be added to the time of the firſt Obſervation, and you will gain the time of the Sun entring that part of the Ecliptic ſought.

Example. *Anno* 1727, at *London* I obſerved the Sun's Meridian Altitude, *March* 9, to be 38° 12′ 56″; and *March* 10, next following, I obſerved his Meridian Altitude to be 38° 36′ 38″. I demand the exact time of the Solar Ingreſs into the Equinoctial Sign *Aries* ?

OPERATION.

1. For the Place of the Sun, anſwering the firſt Obſervation.

	° ′ ″	
Sun's Meridian Altitude obſerved	38 12 56	Subt.
Altitude of the Equator at *London*,	38 28 00	from
Remains Sun's Declination South,	00 15 04	

		° ′ ″	
As S. Obliquity		23 29 00	9.600409
To S. Declination South		00 15 04	7.641594
So Radius ---		90 00 00	10.000000
To S. Long. ſhort of ♈		00 37 48	8.041185
From	12S.	00 00 00	
☉'s true Place obſ.	11	29 22 12	

Note, Becauſe the Meridian Altitude of the Sun is leſs than Alt. Equat. proves Decl. to be South.

2. For the Place of the Sun's anſwering the ſecond Obſervation.

	° ′ ″
Sun's Meridian Altitude obſerv'd	38 36 38
Altitude of the Equator at *London*,	38 28 00
Remains the Sun's Declination North	00 08 38

	° ′ ″	
As S. Obliquity	23 29 00	9.600409
To S. Declination North	00 08 38	7.399484
So Radius ---	90 00 00	10.000000
To S. Longitude paſt ♈	00 21 39	7.799075

Hence

Hence it appears, that the time of the Vernal Equinox happen'd ſome time between the 9th and 10th days at Noon. Then to find out the preciſe time.

	D.		′ ″
Anno 1727 *March*	9	Sun ſhort of the Equinox	37 48 } +
	10	Sun paſt the Equinox	21 39
		Sun's Diurnal Motion, Sum	59 27

Now ſay, by the Logiſtical Logarithms,

	° ′ ″		
As Sun's Diurnal Motion	00 59 27	LL.	40
To one Day, or	24 00 00		3979
So is Diſt. on the 9th day	00 37 48		2007
To the proportional Part	15 15 34		5946

Which is the true time of the Vernal Equinox, *viz.* *March* 10, 15′ 34″ paſt 3 in the Morning, by Obſervation; and agrees exactly with my Tables, which, for your ſatisfaction, you may try at your own leiſure.

And after this manner you may find the Time of the Sun's Entrance into any of the Twelve Signs, or into any Point of the Ecliptic deſired, by taking Two Meridional Altitudes near the time in a known Latitude.

Example 2. *Anno* 1730, *June* 11, at *London*, I obſerved the Sun's Meridional Altitude to be 61° 56′ 54″; and *June* 12, I obſerved it to be 61° 56′ 26″. I demand the time of the Sun's Ingreſs into the Tropical Sign *Cancer*?

OPERATION.

	° ′ ″
Sun's Merid. Altit. obſerv'd *June* 11, was	61 56 54
Altitude of the Equator at *London*	38 28 00
Remains the Sun's Declination North	23 28 54

	° ′ ″	
As S. Obliquity	23 29 00	9.600409
To S. Declination	23 28 54	9.600382
So Radius ----	90 00 00	10.000000
To S. Longitude à ♎	89 21 41	9.999973
From ----	180 00 00	
Remains ----	90 38 19=3S. 0° 38′ 19″ (Sun's Place.	

2. For the Sun's Place, anſwering the ſecond Obſervation.

	° ′ ″
Sun's Meridional Altitude obſerved	61 56 26
Altitude Equat. at *London*	38 28 00
Remains Sun's Declination North	23 28 26

	° ′ ″	
As S. Obliquity	23 29 00	9.600409
To S. Declination	23 28 26	9.600241
So Radius ----	90 00 00	10.000000
To S. Longitude	88 24 28	9.999832
From ---	180 00 00	
Remains ---	91 35 32=3S. 1° 35′ 32″ ☉'s Pl.	

Hence it appears, that the Sun is paſt the Solſtice at both the Obſervations. Therefore,

		S.	°	′	″
☉'s Place obſerved	{ 12 } Day {	3	1	35	32
	{ 11 } is {	3	0	38	19
Sun' Diurnal Motion			0	57	13

Now ſay,

If ☉'s Diurnal Motion	00 57 13	— 206 *Co.Ar.*	794
Give One Day or	24 00 00	3979 }	3979
What will firſt Obſerat.	00 38 19	1948 }	1948
Anſwer, Sub.	16 4 15	5721	5721
From the Day on firſtObſ.	24 00 00		
Sun in ♋ *June* 10	7 55 45	Apparent Time.	

By theſe Examples the young Tyro may find by Obſervation, when the Sun apparently enters any Sign of the Ecliptic; by which he may examine the Solar Tables, whether they

they correspond with the Observations of the present Age; as you will find mine exactly to agree, the Observations being made with a new-invented Quadrant of Brass, answering to a Radius of 270 Feet.

CHAP. III.

An Investigation of the Earth's Aphelion *and Annual Inequality.*

ANNO 1726, *April* 29, at *London*, I observ'd the Sun's Altitude on the Meridian 56° 5′ 16″; *July* 13, following, 58° 24′ 34″, and *September* 8, the same Year, 39° 59′ 55″; by which Meridional Altitudes corrected by Parallax and Refraction, with the Obliquity of the Ecliptic 23° 29′, and the Latitude of *London* 51° 32′ North, the three Longitudes of the Sun are determin'd as follows.

	°	′	″
Sun's Merid. Alt, in the first Observation	56	5	16
Elevation of the Equinoctial at *London* Sub.	38	28	00
Remains the Sun's Declination North,	17	37	16

Now, for the Sun's Place, say,

	°	′	″	
As S. of the Obliquity	23	29	00	9.600409
To S. Declination	17	37	16	9.481040
So Radius ---	90	00	00	10.000000
To S. Longitude from ♈	49	26	10	9.880631

That is, in ♉ 19° 26′ 10″.

2. For

2. For the Sun's Place in the second Obſervation.

	° ′ ″
Sun's Meridian Altitude	58 24 34
Elevation of the Equin. at *London* Sub.	38 28 00
Remains the Sun's Declination North	19 56 34

Now for his Place anſwering.

	° ′ ″	
As S. Obliquity	23 29 00	9.600409
To S. Declination	19 56 34	9.532909
So Radius	90 00 00	10.000000
To S. Longitude	58 52 34	9.932500
From ----	180 00 00	
Remains ----	121 7 26 = 4s. 1° 7′ 26″ ☉'s Pl.	

3. For the Sun's Place in the third Obſervation.

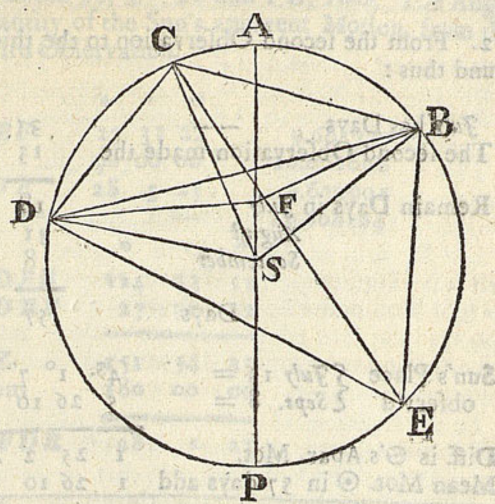
	° ′ ″
Sun's Meridian Altitude ----	39 59 55
Elevation of the Equinoct. at *London* Sub.	38 28 00
Remains the Sun's Declination North	1 31 55

Now for his Place anſwering.

	° ′ ″	
As S. Obliquity	23 29 00	9.600409
To S. Declination	1 31 55	8.427114
So Radius	90 00 00	10.000000
To S. Longitude	3 49 50	8.826705
From ----	180 00 00	
Remains	176 10 10 = 5s. 26° 10′ 10″ ☉'s Pl.	

In the adjacent Diagram, let S repreſent the Sun; on which, as a Center, deſcribe the Circle, whoſe Radius is equal to the Tranſverſe Diameter of the Earth's Ellipſis; draw the Diameter A P, and lay off the Sun's Place obſerved at B C and *D*, by help of the Sector; and draw *S D*, *S B*, *S C*; and alſo from F the upper Focus, draw *F D*, *F B*, *F C*; continue *C F* to *E*, and draw *B C*, *C D*, *D E*, and *E B*: Then be-

because the Angles F B S, F C S, and F D S are equal to half the Elliptic Equation, all the Angles at F and S are known from the times between the Observations, as follows; according to the Method of *Petrus Herigonus*, Professor of Mathematicks at *Paris* 1644. From the first Observation to the second, are 75 days, as appears from this Work.



April	30						
Day obſerv'd	29				°	′	″

April	1	Sun's Place	*April* 29 = ♉		19	26	10
May	31		*July* 13 = ♌		1	7	26
June	30						
July	13		Difference	2	11	41	16
Days	75		between the firſt and ſecond Obſervation,				

and is the Sun's apparent Motion for 75 Days = ∠ *B S C.*

This done, take out of my Aſtronomical Tables the Middle Motion of the Sun for 75 days; which reckoned from the beginning of *January*, will fall upon *Mar.* 16, Mean Mot.

☉ anſwering — — —	2ˢ·	13°	55′	24″
Appar. Mot. ☉ equal to the Arch B A C +	2	11	41	16
Sum	4	25	36	40
Half Sum is the Angle B F C	2	12	48	20

Or ſubtract the Mean Motion ☉ for *April* 29, from the Mean Motion for *July* 13, and the Remainder will be 2ˢ· 13° 55′ 24″, as above.

2. From

2. From the ſecond Obſervation to the third, are 57 days, found thus:

July has Days	31	
The ſecond Obſervation made the	13	Day.
Remain Days in *July*	18	
Auguſt	31	
September	8	
Days	57	

		s.	°	′	″	
Sun's Place obſerv'd	*July* 13 =	4	1	7	26	
	Sept. 8 =	5	26	10	10	
Diff. is ☉'s Apar. Mot.		1	25	2	44	= ∠ *CSD*.
Mean Mot. ☉ in 57 days add		1	26	10	55	= *Feb.* 26.
Sum		3	21	13	39	
Half		1	25	36	49	= ∠ *CFD*.

3. From the firſt Obſervation to the third, are 132 Days.

April has 30 Days.
Obſerv'd 29

Remains 1 Day in *April*.

			S.	°	′	″
In *April*	1 Day	Suns Place obſerv'd *April* 29 =	1	19	26	10
May	31	*Sept.* 8 =	5	26	10	10
June	30					
July	31	Diff. is ☉'s App. Mot. = ∠ *BSD*	4	6	44	00
Aug.	31	Mean Mot. in 132 D. = *May* 12.	4	10	6	19
Sept.	8					
		Sum	8	16	50	19
Sum	132 Days	Half is = ∠ *BFD*	4	8	25	9½

Note, Suppoſing the Logarithm of *FD* 10.000000; then in the Triangle *DEF* are given, (1.) the Radius *DF*, whoſe Logarithm is 10.000000. (2.) the Angle *DFE* 124° 23′ 11″ the Complement of the Angle *CFD* 55° 36′ 49″. (3.) the Angle

Angle D E F 27° 31′ 22″, it being half the Angle of *DSC* 55° 2′ 44″, by *Euclid* 20, 3. To find F *E*, *Note*, The Angle *CSD* is the Quantity of the Sun's apparent Motion, from the second to the third Observation.

	° ′ ″	
As S. ∠ *DEF*	27 31 22	9.664737
To Radius	90 00 00	10.000000
So S. ∠ *FDE*	28 5 27	9.672901
To F E ---	---	10.008164

	°	′	″
∠ *DFE*	124	23	11
∠ *DEF*	27	31	22
Z	151	54	33
From	180	00	00
∠ *FDE*	28	5	27

2. In the Triangle *FEB* are known, (1.) *FE* just now found. (2) the Angle F E B 35° 50′ 38″, it being half of the Angle *BSC* 71° 41′ 16″, the apparent Motion of the Sun from the first to the second Observation. (3.) the Angle B F E 107° 11′ 40″, it being the Complement of the Angle B F C 72° 48′ 20″, to find F B.

	° ′ ″		
As S. Angle FBE	36 57 42	Co. Ar.	0.220922
To F E ---		---	10.008164
So S. ∠ F E B	35 50 38		9.767587
To F B			9.994673

	°	′	″
∠ E F B	107	11	40
∠ F E B	35	50	38
Z	143	02	18
From	180	00	00
∠ F B E	36	57	42

3. In

3. In the Triangle *D B F* are given, (1.) FB, just now found; (2.) The Angle *DFB* 128° 25′ 9″ ½; (3.) The Side *DF*, to find the Angle *D B F*, and the Side *D B*.

This is the second Axiom of Oblique-angled plain Triangles; which is, As the Sum of the two Sides, including the given Angle; Is to their Difference; *So* is the Tangent of half the Sum of their opposite Angles, *To* the Tangent of half the Difference of the said Angles: Which added to the half Sum of the opposite Angles, gives the greater Angle sought; and subtracted, gives the lesser. But in this Case, because we have only the Logarithm of the Sides given, you must work thus, *viz*.

To the Logarith. of *DF* 10.000000, add Radius 10.000000, and from that Sum 20.000000, subtract the Logarithm of F B found in the last Operation, and that gives the Tangent of an Arch; from which always subtract 45°, and note the remaining Arch. See the Operation at large.

To Radius *D F.*	10.000000
Add the Logarithm	10.000000
Double Radius	20.000000
F B subt. —	9.994673
Tang. 45° 21′ 5″	10.005327
Sub. 45 00 00	
Rem. 00 21 5	
∠ *DFB*	128° 25′ 09″ ½
From	180 00 00
Z of ∠ ∠	51 34 50 ½
Half =	25 47 25 ¼

Now

New ſay,

		° ′ ″	
As Radius	---	90 00 00	10.000000
To *t.* of the remaining Arch		00 21 05	7.787634
So t. of half Z of oppoſ. Ang.		25 47 25	9.684136
To *t.* of half X of the Ang, +		00 10 11	7.471770
Sum is the ∟ *D B F*		25 57 36	

Half Z Oppoſit. ∟ ∟	25° 57′ 25″
Half X ∟ ∟	00 10 11
∟ *F D B*	25 37 14

Now, for the Side *D B* ſay,

	° ′ ″	
As *S.* ∟ *D B F*	25 57 36	9.641219
To Radius = *D F*	90 00 00	10.000000
So S. ∟ *D F B*	51 34 50 ½	9.894030
To *D B*		10.252811

---

4. In the Triangle *D S B*, are known, (1.) *D B* juſt now found. (2.) The Angle *D S B* 126° 44′ 00″, it being the Sun's apparent Motion from the firſt to the ſecond Obſervation. (3.) The Angles *S D B* and *S B D* are both known to be the ſame Quantity; becauſe the Triangle is Iſoſceles, *viz.* *S D* and *S B* are equal; therefore the Angles they ſubtend, are alſo equal, being half the Complement of the Angle *D S B* to a Semicircle, to find *D S*.

	° ′ ″	
As *S.* ∟ *D S B*	53 16 00 Co. Ar.	0.096136
To D B		10.252811
So S. ∟ *D B S.* ..	26 38 00	9.651648
To *D S*		10.000595

∟ *D S B*	126°	44′
From	180	00
Z of ∟ ∟	53	16
∟ *S D B*	26	38
∟ *S B D*	26	38

5. In

5. In the Triangle F D S, are given, (1.) F D = Radius. (2.) D S just now found. (3.) ∟ F D S, to find the Angle F S D, and F S: That is, as in the third hereof: The Logarithm of two Sides of a plain Triangle, and the Angle comprehended being given, to find the other Angles.

1. As the lesser Side is to the grearer; so is Radius to the Tangent of an Arch.

2. As the Tangent of 45°,
Is to the Tangent of the found Arch less 45°;
So is the Tangent of half the opposite Angles,
To the Tangent of half their Difference.

OPERATION.

As the lesser Side *D F*		10.000000
To the greater *D S*	—	10.000595
So Radius	— —	10.000000
To the *t.* of the Arch	45° 2′ 21″	10.000595
Sub.	45 0 00	
Rem.	00 2 21	

Now say,

		° ′ ″	
As t. of	—	45 00 00	10.000000
To t. of the remaining Arch		00 02 21	6.826388
So t. half Z Op. ∟∟ at F and S		89 29 37	12.045137
To t. of half their X sub.		4 15 16	8.871525

Rem. ∟ *F S D* the true Anom. 85 14 21 = 2S. 25° 14′ 21″

∟ *S D B*	26°	38′	00″
∟ *F D B*	25	37	14
∟ *S D F*	1	00	46
From	180	00	00
∟∟ *F* & *S*	178	59	14
Half =	89	29	37

For

For F. S.

	° ′ ″	
As S. ∠ F S D	85 14 21	9.998499
To D F Radius	90 00 00	10.000000
So S. ∟ F D S	1 00 46	8.241975
To F S	—	8.243476
Place of ☉ in the hir Obſervation		5S. 26° 10′ 10″
The ∟ F S D = to true Anom. ſub.		2 25 14 21
Remains the ☉'s true Apogeon		3 00 55 49
And the Aphelion of the Earth		9 00 55 49

6. For the Eccentricity of the Earth in ſuch Parts as her mean Diſtance from the Sun, is 100000, the Proportion is,

As D S, found in the 4 hereof	10.000595
To S F, found in the 5	8.233476
So is the mean Diſtance 100000	5.000000
To the Eccentr. Parts C F 1749	3.242881

This being corrected according to the following Scheme, will be equal to C K 1692.

7. To find the mean Anomaly.

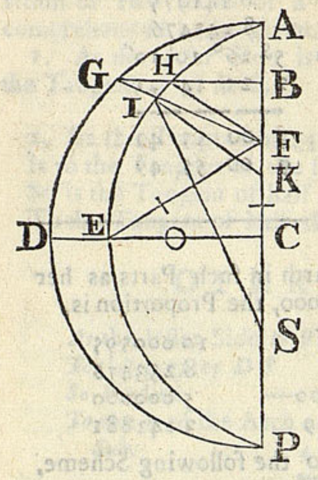
Firſt, You are to obſerve (in all the Planets) that the difference between the true and mean Anomaly is the Elliptic Equation; which, in the firſt Obſervation is the Double of the Angle F B S; in the ſecond, the double of the Angle FCS; and in the third, the double of the Angle F D S: But this way of Inveſtigation ſtands in need of a Correction, as ſhall be ſhewn by and by. But firſt, for the mean Anomaly.

In the third Obſervation, the Angle F D S is 1° 0′ 46″; which doubled, is 2° 1′ 32″, the Equation; and the Angle F S *D* is the true Anomaly, 2S. 25° 14′ 21″; then what's the mean Anomaly?

True Anomaly = ∠ F S D		2S. 25° 14′ 21″
Double of ∠ S*D*F	add	2 1 32
Sum is the mean Anom. at the 3*d* Obſerv.		2 27 15 53

8. To correct the Elliptic Equation.

Let A H I E P be suppos'd the Semi-Ellipsis, and the Semicircle A G D P, describ'd upon the Extreams of the Transverse Diameter, the Ordinates C E and B H being extended to D and G, in the Periphery of the Circles: Then,



As C D : B G : : C E : B H.

Therefore,

As CE ; CD : : t. BFH t. B FG.

But before we can clear up this Analogy, we must first shew how to find C E, the Semiconjugate of the Ellipsis, which is done thus:

In the Right-angled Triangle FCE, are given FE, the mean Distance of the Sun from the Earth 10.0000, and F C the Eccentricity 1692, to find C E, the semiconjugate Diameter; which is done by the 47th of the first of *Euclid*, thus:

Square of { E F		10000000000
Square of { C K		2862864
Remains	—	9997137136(99985=EC.

Now suppose the Sun at I in the Ellipsis; then will the Angle AFH be the Mean Anomaly, and in the third Observation equal to 2s. 27° 15′ 53″, AFG the correct Anomaly; draw IK parallel to H F; then is the Angle KIF = HFI the Variation; which in the first and fourth Quadrants of the Ellipsis are to be subtracted from the Elliptic Equation; but in the second and third, added. So that in the third Observation above, the Sum is in the first Quadrant, and the Variation equal to the Angle KIF, is thus obtain'd:

As

As CE, the Semiconjugate		99985	4 999935
To CD, the Mean Diſtance		100000	5.000000
So t. ∠ AFH	85° 15′ 53″		11.320 792
To t. ∠ AFG	87 15 54		11.320857

Difference is the Variat. 1 = ∠ KIF.
Equat. found = ∠ SIF 2 1 32
Abſolute Equation is 2 1 31 = ∠ SIK.

But by a Repetition of the Work, I find in the third Obſervation,

	S.	°	′	″	
The Mean Anomaly	2	19	52	46	
The Elliptic Equation		1	54	4	ſub.
Apogeon of ☉	3	8	11	28	

And the Eccentricity 1692 Parts, ſuch as the Mean diſtance of ☉ from the Earth is 100000.

And in the firſt and ſecond Obſervations, as follows.

	Anom. S.	°	′	″	*Equat.* °	′	″		*Apog.* S.	°	′	″	*Eccentr.*
1.	10	9	46	50	1	28	15	+	3	8	11	5	1692
2.	0	23	42	00	0	45	52	−	3	8	11	18	

CHAP. IV.

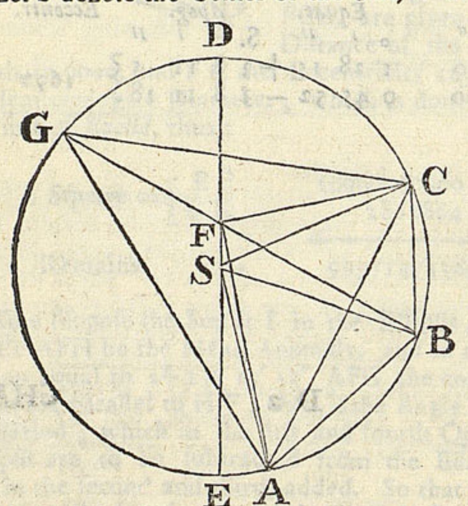
To find the Mean Anomalies, Eccentricities and Aphelions of the Three Superiour Planets.

TO do this, there muſt be had the true Equal Times of their being in Oppoſition to the Sun, and taken three ſeveral times in that Achronical Poſture, as follows:

Example. The equal times of three Oppoſitions of the *Sun* and *Mars*, taken at *London* by my ſelf, were as follows.

	d.	h.	′	″		*Heliocentric Place* ♂ S.	°	′	″	
Anno 1719 *Aug.*	16	10	48	36	A	11	3	55	27	From
1721 *Octob.*	24	14	32	13	B	1	12	37	49	Vernal
1723 *Dec.*	10	6	59	38	C	2	29	27	54	Equin.

Let S denote the Center of the Sun, F the other *Focus* of the Ellipſis of *Mars*; the Semidiameters of the Circle S A, S B, S C, being equal to the tranſverſe Diameters of the Ellipſis; and paſſing by his Places in the firſt Obſervation at A, in the ſecond at B, and the third at G; from which draw Lines to the Sun at S, and alſo to the *Focus* at F; continue B F to G, and draw the order Lines, as in the Figure.



1. From

1. From the first Observation to the second, the apparent Motion of *Mars* in the Arch A B is thus found:

		S.	°	′	″
Place of *Mars*	B	1	12	37	49
	A	11	3	55	37
Apparent Motion	A B	2	8	42	12

From *August* 16, at 10 h. 48′ 36″, 1719, to *October* 25, 1721, at 32′ 13″ past 2 in the Morning, is two Years compleat, and 69 d. 3 h. 43′ 37″.

OPERATION.

	D.	°	′	″		
August has	31	00	00	00	*Jan.*	31
First Observation	16	10	48	36	*Feb.*	28
					Mar.	10
Remains	14	13	11	24		—
September	30	00	00	00	Days	69
October	24	14	32	13		
Time —	69	03	43	37	over and above 2 Years	

Now, from my Astronomical Tables of the Middle Motion of *Mars*, collect his Mean Motion, as follows.

	S.	°	′	″
Two Years compleat	0	22	34	19
Mar. 10 = 69 Days Motion	1	06	09	39
Hours 3 — —			3	56
Minutes 43 — —				56
Seconds 37 — —				1
Mid. Mot. from the first to 2*d* Obs.	1	28	48	51
Apparent Motion = Arch A B	2	08	42	12
Sum	4	07	31	03
Half = ∠ A F B —	2	03	45	31 ½

2. From

2. From the second Observation to the third, the Motions of *Mars* are gain'd,

	S.	°	′	″	
Place of *Mars* C	2	29	27	54	
Place of *Mars* B	1	12	37	49	*Jan.* 31
Appar. Mot. = B C	1	16	50	05	*Feb.* 15
October has	31	00	00	00	Days 46
Second Observ. was	24	14	32	13	
Remains	6	09	27	47	
November	30	00	00	00	
December	10	06	59	38	
Time —	46	16	27	25	over and above two Years.
Two Years compleat	00	22	34	19	
February 15	00	14	06	28	
Hours 16 —			20	58	
Minutes 27 —				35	
Seconds 25				1	
Mean Mot. from 2*d* to 3*d*	1	17	02	21	
Appar. Mot. = B C	1	16	50	05	
Sum	3	03	52	26	
Half is = ∠ B F C	1	16	56	13	

	°	′	″
The Arch A B	68	43	12
The Arch B C	46	50	15
Sum	115	32	27
	360	00	00
Arch CDGA	244	27	33

	°	′	″
The ∠ AFB	63	45	31
The ∠ BFC	46	56	13
The ∠ CFA	110	41	44

Now suppose the Logarithm of CF to be 10.000000.

1. In the Triangle CFG are given (1.) the ∠ CFG 133° 3′ 47″, it being the Complement of the ∠ BFC to a Semicircle. (2.) the ∠ CGF 23° 25′ 2″ being half the Angle at the Center BSC 46° 50′ 5″. (3.) *CF*, its Logarithm as above, requir'd *FG*?

As

As S. ∠ CGF	23° 25′ 2″	9.599254
To Radius CF	90 00 00	10.000000
So S. FCG	23 31 11	9.601043
To FG		10.001789

CGF	23° 25′ 2″
CFG	133 3 47
Z	156 28 49
	180 00 00
FCG	23 31 11

2. In the Triangle *FAG* are given, (1.) *FG* just now found. (2.) The Angle *FGA* 24° 21′ 6″, it being half the Angle at the Center *ASB* 68° 42′ 12″, the apparent Motion from the first to the second Observation. (3.) The Angle *AFG* 116° 14′ 29″, it being the Complement of the Angle *AFB* 63° 45′ 31″ to a Semicircle, to find FA?

OPERATION.

As S. ∠ FAG		29° 24′ 25″ Co Ar.	0.308911
To FG	----	----	10.001789
So S. ∠ FGA		34 21 6	9.751518
To FA	----	----	10.062218

AFG	116° 14′ 29″
FGA	34 21 6
Z	150 35 35
From	180 00 00
FAG	29 24 25

3. In

3. In the Triangle CFA are given, (1.) FA, just now found (2.) CF = to Radius. (3.) The Angle CFA 110° 41′ 44″, being the equal Motion of *Mars* from the first to the third Observation, to find the Angle *FAC* and the Side *CA*?

As the lesser Side C F		—	10.000000
To the greater F A		—	10.062218
So Radius	----	—	10.000000
To t. of the Arch	49° 5′ 25″		10.062218
Sub.	45 0 00		
Rem.	4 5 25		

BFC	46°	56′	13″
AFB	63	45	31
CFA	110	41	44
From	180	00	00
Z ∠ ∠	69	18	16
Half	34	39	08

As the t. of	45° 0′ 0″	10.000000
To t. of the rem. Arch	4 5 25	8.854351
So t. Z opp. ∠ ∠ A & C	34 39 8	9.839607
To t half their X	2 49 47	8.693958
Rem. ∠ *FAC*	31 49 21	
Sum is ∠ *FCA*	37 28 55	

Now, for the Side *AC*.

As S. ∠ *FCA*	37° 28′ 55 Co. Ar.		0.215732
To *FA*	----	---	10.062218
So S. ∠ *CFA*	29 18 16		9.971031
To *AC*	----	---	10.248981

4. In the Isosceles Triangle *C S A*, there are given *C A* just now found. (2.) The Angle *C S A* 115° 32′ 17″, requir'd *C S*?

OPERATION.

Apparent Motions are the ∠ ∠	*ASB*	68°	42′	12
	BSC	46	50	5
	CSA	115	32	17
	from	180	00	00

Complem. 64 27 43, ½ is = 32° 13′ 51″ ½ is the ∠ at *SCA* and *SAC*; because the Triangle is Isosceles.

As S. ∠ *SCA*	64° 27′ 43″	Co. Ar.	0.044649
To C A	----	----	10.248981
So S ∠ *CAS*	32 13 51		9.726997
To CS	----	----	10.020627

5. In the Triangle FSC, are known, (1.) CF, as at first = 10.000000. (2.) C S, just now found 10.020627. (3.) The ∠ FCS 5° 15′ 4″, to find the ∠ FSC, the true Anomaly, and FS, the Eccentricity?

As the lesser Side F C		10.000000
To the greater S C		10.020627
So Radius	----	10.000000
To *t.* of the Arch	46° 21′ 36″	10.020627
Sub.	45 00 00	
Remains	1 21 36	
FCA	37° 28′ 55″	
SCA	32 13 51	
FCS	5 15 4	
From	180 00 00	
Z ∠ ∠	174 44 56	
Half	87 22 28	

Now

New say,

As *t.* of	45° 00′ 00″	10·000000
To *t.* of rem. Arch	1 21 36	8.375477
So *t.* half Z opp. ∠ ∠	87 22 28	11.338599
To *t.* half their X	27 22 13	9.714076

Rem. ∠ FSC true Anom, 60· 00 15	=	2s. 0° 0′ 15″
Place of ♂ at the 3*d* Obfervation add		2 29 27 54
Aphelion of ♂	= —	4 29 28 09

	87°	22′	38
	27	22	28
Z	114	44	41
from	180	00	00
Rem.	65	15	19

= ∠ S F C

For *F S.*

As S. ∠ FSC	60° 00′ 15″	9.937549
To C F	90 00 00	10.000000
So S. ∠ FCS	5 15 4	8.961520
To F S	----	9.023971

Or thus:

	° ′ ″	
As *S.* ∠ *S F C*	65 15 19 Co.	·0.041828
To *S C*	---	10.020627
So S. ∠ *F C S*	5 15 4	8.961520
To *FS*	—	9.023975

6. For the Mean Anomaly in the third Obfervation, &c. the Angles *SAF, SBF. SCF,* are half the Elliptic Equations in the firft, fecond, and third Obfervations; which doubled, and added to the true Anomaly, equal to the Angles *E S A, ASB, ASC* in the firft Semicircle of the Ellipfis. but fubtracted in the fecond Semicircle, the Sum or Difference is the Mean Anomaly.

Examp[le]

Example in the Work before us.

	S	°	′	″
From	12	00	00	00
True Anomaly = ∠ *FSC* sub.	2	00	00	15
	9	29	59	45
The ∠ *FCS* 5° 15′ 4′ doub. is Equat. sub.		10	30	04
Rem. the Mean Anom. in the 3*d* Obſervat.	9	19	29	41
Mid. Mot. of *Mars* from the 2*d* to the 3*d* Obſ.	1	17	02	21
Mean Anom. in the 2*d* Obſervation	8	02	27	20
Mean Mot. from the 1*ſt* to the 2*d* Obſervat.	1	28	48	51
Rem. Mean Anom. in the firſt Obſervation	6	03	38	29

7. For the Eccentricity.

As *CS*	10.020627	Co. Ar.	9 979373
To *FS*	---	----	9.023971
So Mean Diſtance	151955		5 181716
To Eccentricity	15313		4.185060

You muſt now make a Repetition of the above Work, by reaſon the Angle at *F* at the firſt ſtating is not perfectly true; but by going over of the Work again, I find the Place of the Aphelion in

	S.	°	′	″
the 1 Obſervation to be	5	0	56	08
the 2 Obſervation to be	5	0	58	49
the 3 Obſervation to be	5	1	1	18

And the Eccentricity 14169 and a half, ſuch Parts as the Mean Diſtance is 151955, and the Mean Anomalies and Elliptic Equations were as is here ſet down.

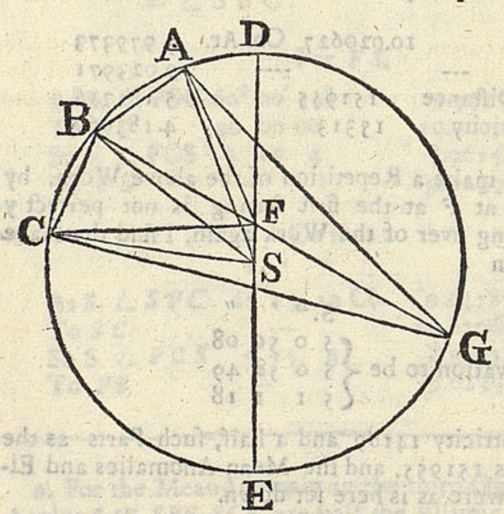
Mean

	Mean Anom.					Equat.				
	S.	°	′	″		S.	′	″		
1	6	2	28	10	A	0	31	9	add.	Double ∠ *SAF*
2	8	1	45	57	B	9	53	3	add.	*SBF*
3	9	18	45	48	C	9	40	48	add.	*SCF*

Example 2. By three Oppositions of the Sun and *Jupiter* I observed at *London*, the Anomalies, Aphelions, and Eccentricity of *Jupiter* is requir'd?

			D.	h.	′	″		Heliocent. Place ♃ S.	°	′	″
Anno	1721	*April*	9	10	33	25	A	7	0	41	34
	1722	*May*	11	8	55	30	B	8	1	18	10
	1723	*June*	14	3	49	13	C	9	3	21	24

With any convenient Radius sweep the Diameter, and draw the Diameter D F S E, which shall represent the Aphelial Line of *Jupiter* in the first, second and third Observations, from which draw Lines to S the Sun, and also to F, the other Focus of *Jupiter*'s Ellipsis; continue B F to G, and draw the other Lines as in the *Scheme*; then by the Solution of the several Triangles, as has been shewn in *Mars*, and by repeating the Work, and correcting the Angle FAS, FBS, FCS, I have at last found.



Mean

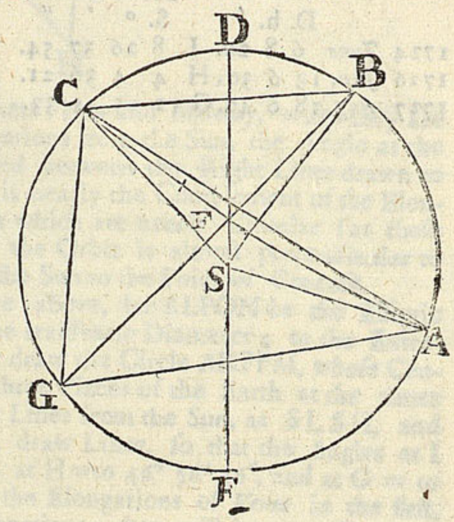
Mean Anom.	Aphelions.	Equations.	
S. ° ′ ″	S. ° ′ ″	° ′ ″	
1. 0 22 43 31.	6 9 59 20.	A 2 1 17 sub.	Eccen-
2. 1 25 42 7.	6 10 00 38.	B 4 24 35 sub.	tricity
3. 2 28 49 57.	6 10 01 58.	C 5 30 31 sub.	25074 ½

such Parts as the Mean Distance of ♃ à ☉ is 519995.

Example 3. By three Oppositions of the Sun and *Saturn* observ'd by me at *London*, I determin'd the Anomalies, Aphelions and Eccentricities, as follows.

	D. h. ′ ″	Heliocentr. Pl. ♄. S. ° ′ ″
Anno 1714, *Febr.*	15 11 25 14.	A 5 8 3 35
1720, *May*	1 5 28 0.	B 7 22 1 19
1727, *July*	24 9 33 0.	C 10 11 47 59

With any convenient Radius draw the Circle, and the Diameter DE, which shall represent the Aphelial Line of *Saturn*, A B and C the Places of *Saturn* in the first, second and third Observations; from which Lines to S the Sun, and also to F the other *Focus* of the Ellipsis, continue BF to G, and draw the other Lines, as in the Figure; so shall SA, SB, SC represent the transverse Diameter of the Ellipsis. Then by the Solution of the several Triangles, and by repeating the Work, correcting the Angles, &c. I have at last found.



Mean

	Mean Anom.	Aphelion	Equat.	
	S. ° ′ ″	S ° ′ ″	° ′ ″	
1.	8 3 10 46.	A 8 28 52	9=6 0 40	
2.	10 18 56 51.	B 8 29 00	26=4 4 2	
3.	1 17 11 50.	C 8 39 10	6=4 33 57	sub.

Eccentricity 54376 in such Parts as the Mean Distance of *Saturn* from the Sun is 953309.

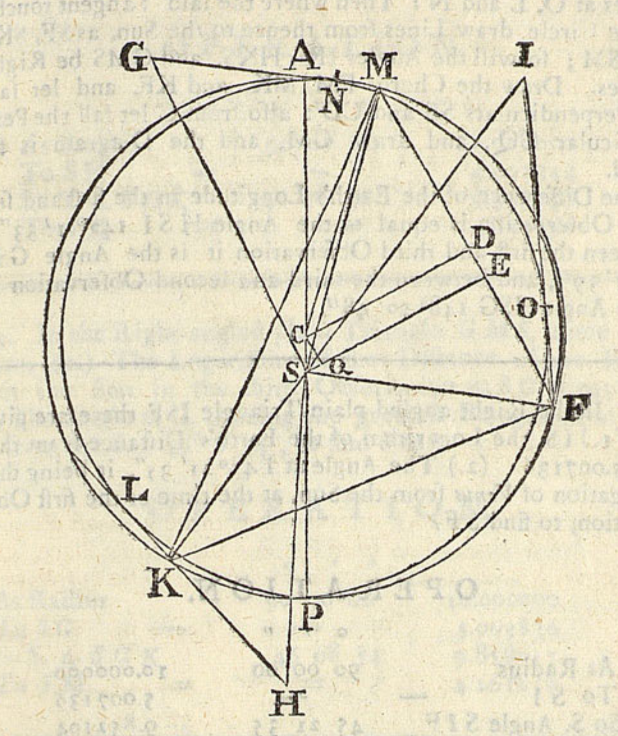
CHAP. V.

By three Observations of the greatest Elongations of Venus *from the* Sun, *to determine the Mean Anomalies, Aphelions and Eccentricities.*

Example. AT *London* I observed the three greatest Elongations of ♀ from ☉, and the Earth's Place, with its Logarithm of its Distance from the Sun to be as follows.

	D. h. ′	Pl. of Earth. S. ° ′ ″	Log. à ☉	Elongat. ° ′ ″
1724 *June*	6 8 20.	I 8 26 37 54.	5.007136	45 21 35
1726 *Jan.*	13 6 30.	H 4 4 36 21.	4.993344	46 56 46
1727 *Aug.*	18 6 40.	G 11 5 45 33.	5.003836	46 8 54

In



In the inferiour Planets *Venus* and *Mercury*, when they are at their greateſt Elongations from the Sun, the Angle at the Sun's Center, contained between the Right Lines drawn to the Earth and Planet, is nearly the Complement of the Elongation: and in Orbits which are nearly Circular (as theſe are) a Line touching the Orbit is almoſt perpendicular to the Line drawn from the Sun to the Point of Contact.

Now in the Figure above, let ALPON be the Elliptic Orbit of *Venus*, AP the tranſvarſe Diameter; to the Extremity of this Diameter draw the Circle AKPFM, whoſe Center is C; then to the three Places of the Earth at the times of Obſervation, draw Lines from the Sun, as SI, SH, and SG; from I,H and G, draw Lines, ſo that the Angles at I may be $=45^{\circ}\ 21'\ 35''$, at H=to $46^{\circ}\ 56'\ 46''$, and at G = to $46^{\circ}\ 8'\ 54''$, which are the Elongations of *Venus* in the firſt, ſecond and third Obſervations; they will become Tangents to the Orb of the Planet, and touch it in its Heliocentric Places

Places at O, L and N: Then where the ſaid Tangent touches the Circle, draw Lines from thence to the Sun, as SF, SK, and SM; ſo will the Angles IFS, HKS, and GMS be Right Angles. Draw the Chords FM, MK, and KF, and let fall the Perpendiculars SE and CD: alſo from C let fall the Perpendicular CQ, and draw CM, and the Diagram is finiſh'd.

The Difference of the Earth's Longitude in the firſt and ſecond Obſervation is equal to the Angle HSI 142° 1′ 33″; between the firſt and third Obſervation it is the Angle GSI 69° 7′ 39″, and between the third and ſecond Obſervation it is the Angle HSG 148° 50′ 48″.

---

1. In the Right-angled plain Triangle ISF there are given, (1.) IS, the Logarithm of the Earth's Diſtance from the Sun 5.007136. (2.) The Angle at I 45° 21′ 35″, it being the Elongation of *Venus* from the Sun, at the time of the firſt Obſervation, to find SF?

OPERATION.

	° ′ ″	
As Radius	90 00 00	10.000000
To SI —	—	5.007136
So S. Angle SIF	45 21 35	9.852194
To SF —	—	4.859330

---

2. In the Right-angled plain Triangle HKS there are given, (1.) HS the Logarithm of the Diſtance of the Earth from the Sun in the ſecond Obſervation 4.993344. (2.) The Angle at H, it being the Elongation of *Venus* from the Sun 46° 56′ 46″, to find SK?

OPE-

OPERATION.

		° ′ ″	
As Radius		90 00 00	10.000000
To S H	=	—	4.993344
So S. ∠ *S H K*		46 56 46	9.863746
To *S K*	=	—	4.857090

3. In the Right-angled plain Triangle *G M S*, there are given, (1.) The Logarithm of the Distance of the Earth from the Sun in the third Observation = *S G* 5.003836. (2.) The Angle at G, it being the greatest Elongation of *Venus* from the Sun 46° 8′ 54″, to find *S M*?

OPERATION.

		° ′ ″	
As Radius		90 00 00	10.000000
To *S G*	—	—	5.003836
So S. ∠ *S G K*		46 08 54	9.858017
To *S M*	=	=	4.161853

4. In the Triangle *S F M* are given, (1.) The Logarithm of *S M* found in the third hereof. (2.) The Logarithm of. *S F* found in the first hereof. (3.) The ∠ *F S M* 69° 54′ 58″, as will be shewn below, to find the Angles at *F* and *M*, and the Side *F M*?

OPERATION.

As the lesser Side *S F*		4.859330
To the greater *S M*		4.861853
So Radius	90° 00′ 00″	10.000000
To *t.* of	45 09 59	10.002523
Sub.	45 00 00	
Remains	00 09 59	

Now, to find the Angle F S M, observe the following Steps.

OPERATION.

	°	′	″	
HSG	148	50	48	
GSM	43	51	6	Compl. of ♀ Elong. at 3*d* Observ.
HSM	192	41	54	
From	360	00	00	
HSM	167	18	06	
HSI	142	01	33	
MSI	25	16	33	
FSI	44	38	25	Compl. of ♀ Elong. at 1*st* Observ.
FSM	69	54	58	
From	180	00	00	
Z∠∠atM&F	110	05	02	
Half	55	02	31	

Now say,

	°	′	″	
As Radius, or *t.* of	45	0	0	10.000000
To *t.* of the remaining Arch	0	9	59	7.462964
So *t.* half Z ∠ ∠.	55	2	31	10.155450
To *t.* half their X	0	14	17	7.618414
Z is the ∠ *SFM*	55	16	48	
X is the ∠ *SMF*	54	48	14	

For F M.

As S. ∠ *SFM*	55° 16′ 48	Co. Ar.	0.085157
To *S M*	----		4.861853
So S. ∠ *FSM*	69 54 58		9.972753
To *F M*	83131		4.919763

5. In the Triangle *SKM* are given, (1.) The Logarithm of *SK*, as found in the second hereof. (2.) The Logarithm of *SM*, as found in the third. (3.) The Angle *KSM* 149° 38′ 40″, to find the Angles, and the Side *KM*?

OPERATION.

As the lesser Side *KS*		4.857090
To the greater *SM*	------	4.861853
So Radius	90° 00′ 00″	10.000000
To *t.* of	45 18 50	10.004763
Sub.	45 00 00	
Remains	00 18 50	

	° ′ ″
HSM	192 41 54
HSK	43 3 14
KSM	149 38 40
From	180 00 00
Z ∠ ∠ =	30 21 20
Half =	15 10 40

	° ′ ″	
As Radius, or *t.* of	45 00 00	10.000000
To *t.* of remaining Arch	00 18 50	7.738570
So *t.* half Z ∠ ∠	15 10 40	9.433413
To *t.* half X	00 05 06	7.171983
Z is the ∠ *SKM*	15 15 56	
X is the ∠ *SMK*	15 05 34	

For KM.

As S. ∠ *SKM*	15° 15′ 56″ Co. Ar.	0.579561
To *SM*	---- ---	4.861853
So S. ∠ *KM*	30 21 20	9.703604
To *KM*	139642	5.145018

 6. In

6. In the Triangle FSK, are given, (1.) S F. as found in the first. (2.) The Logarithm of S K, as found in the second. (3.) The Angle KSF 40° 26′22″, as will be shewn below; to find the Angles at F and K, and the side KF?

OPERATION.

As the lesser side *S K*				4.857090
To the Greater *S F*				4.859330
So Radius	90°	00′	00″	10.000000
To *t*. of the Arch	45	08	52	10.002240
Sub.	45	00	00	
Remains	00	08	52	

HSI	142°	01′	33″
HSI +	43	03	14
KSI	185	04	47
ISF —	44	38	25
KSF	140	26	22
From	180	00	00
Z ∠ ∠	39	33	38
Half	19	46	49

As Radius or *t*.	40	00	00	10.000000
To *t*. of remaining Arch	00	08	52	7.411150
So *t*. half Z ∠ ∠	19	06	49	9.555859
To *t*. half X	00	03	13	6.967009
Z ∠ *SKF*	19	50	02	
X ∠ *SFK*	19	48	36	

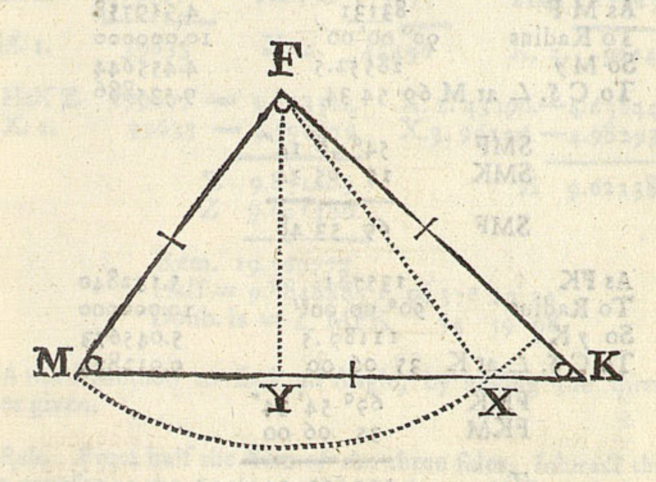
For K F.

As S. ∠ *SFK*	19° 43′ 36 Co. Ar.	0.471682
To *SK*	—	4.857090
So S. ∠ *KSF*	39 33 38	9.804067
To *KF*	135781	5.132840

7. In

7. In the Triangle FMK, are given, (1.) The Side F M 83131. (2.) The Side K M 139642. (3.) The Side K F 135781, that is, all the Sides, to find the Angles; and falls under the third Axiom of Oblique-angled plain Triangles.

I ſhall here ſhew three ſeveral Ways of ſolving this Triangle; and firſt by the common Method. And that the Reader may have a better Idea of the Performance, I ſhall take the Triangle FMK out of the fundamental Diagram, and lay it down, as in the Margin, to prevent a Confuſion of Lines.



OPERATION.

FK	135781
MF	83131
Z	218912
X	52650

Now say,

As MK the longest Side	139642	Co. Ar.	4.854982
To Z of the other 2 Sides	218912		5.340270
So is their X	52650		4.721398
To *x* K the alternate Base	82537		4.916650
From MK	139642		
Remains M*x*	57105		
Half = M*y* = *yx*	28552.5		
+ *x*K	82527		
Z = *y*K	111089.5		

As M F	83131	4.919758
To Radius	90° 00′ 00″	10.000000
So M*y*	28552.5	4.455644
To C S. ∠ at M	69 54 34	9.535886

SMF	54° 48′ 14″
SMK	15 05 34
SMF	69 53 48

As FK	135781	5.132840
To Radius	90° 00′ 00″	10.000000
So *y*K	11189.5	5.045673
To C S. ∠ at K	35 06 00	9.912833

FMK	69° 54′ 34″
FKM	35 06 00
Z	105 00 34
From	180 00 00
MFK	74 59 26

2. The second Operation may be wrought more expeditiously thus, *viz*. Take the Difference between the half Sum and each Side severally, and note the Differences with the Figures 1, 2, 3. Then take the Logarithm of the half Sum, and first Difference, and add them together; also add the Logarithms of the second and third Differences together; sub.

subtract the Sum of the first two Logarithms from the Sum of the last two, and take half this remaining Logarithm, adding Radius, and it shall be the Tangent of half the Angle sought.

See the Work.

MK	139642
FK	135781
MF	83131
Z	358554
Half	179277

MK	139642	FK	135781	MF	83131
Half Z	179277	Half Z	179277	Half Z	179277
Diff. 1.	39635	X. 2.	43496	X. 3.	96146

Half Z	179277 — 5.253524		X. 2. 43496.—4.638449	
X. 1.	39635 — 4.598079		X. 3. 96146.—4.982931	
	Z 9.851603		Z 9.621380	
	Z 9.621380			

Rem. 19.769777
Half = 9.8848885 *t.* of 37° 29′ 34″
Doub. is = ∠ MFK 74 59 08

A third Method to find an Angle, by having the three sides given.

Rule. From half the Sum of the three sides, subtract the side opposite to the Angle requir'd, and note the Remainder; then to the Co. Ar. of the two sides, including the required Angle, add the Logarithm of half the Sum of the sides, and the Logarithm of the Remainder; half the Sum of these four Logarithms will be

Operation *for the Angle* F *in the last Figure.*

F K	135781	Add.
M F	83131	
M K	139642	
Z	358554	
Half	179277	
M K —	139642	
Rem.	39635	

F K	135781	Co. Ar.	4.867161
M F	83131	Co. Ar.	5.080237
Half Z	179277		5.253447
X	39635		4.598079
Sum Logarithms			19.798924
Half is C S. of	37° 30′ 3″		9.899462
Double = ∠ F	75 00 6		9.899467

8. In the Right-angled Triangle *SEF* are given, (1.) The side *S F*, as found in the first. (2.) The Angle *S F E* 55° 16′ 48″, as found in the fourth; to find *SE* and *FE*?

As Radius	90° 00′ 00″	10.000000
To S F		4.859330
So S. ∠ S F E	55 16 48	9.914843
To S E	59453	4.774173
As Radius	90 00 00	10.000000
To S F		4.859330
So S. ∠ FSE	34 43 12	9.755544
To F E	41197	4.614874

MF	83131
Half = DF	41565.5
EF sub.	41197
Rem. DE=CQ	368

9. In the Triangle CDM, are given (1.) The Side DM, it being half of *Mf* 41565.5. (2.) The Angle MCD, it being equal to the Angle *f*KM 35° 9′ 30″, and consequently the Angle *CMD* is 54° 50′ 30″; because the Angle at D is right; to find *CM* and *CD*?

	° ′ ″	
As S. ∠ *DCM*	35 09 30	9.760300
To *DM*	41565.5	4.618733
So Radius	90 00 00	10.000000
To *CM*	72182	4.858433

the Semidiameter of the Orb, equal to the mean Distance of ♀ *à* ☉.

As Radius	90 00 00	10.000000
To CM	——	4.858433
So S. ∠ *CMD*	54 50 30	9.912521
To *CD* sub.	59014	4.770954
SE ——	59453	
Rem. SQ	439	

10. In the Right-angled plain Triangle SCQ are given, (1.) SQ 368. (2.) SQ 439, to find SC, the Eccentricity and Aphelion?

As S Q	439	2.642465
To Radius	90° 00′ 0″	10.000000
So S Q	368	2.567026
To *t.* ∠ CSQ=ASE	40 02 55	9.924561
∠ FSE +	34 43 12	
Z ∠ ASF	74 46 07	
Sub. ∠ ISF	44 38 25	
Rem. ∠ ASI	30 07 42	
Earth's Place at I	8 26 37 54	
Aphelion A	9 26 45 36	

	° ′ ″
	90 00 00
C S Q	40 02 55
S C Q	49 57 05

As S. ∠ SCQ	49° 57′ 5″	9.883945
To SQ	439	2.642465
So Radius	90 00 0	10.000000
To S C Eccentricity	573.5	2.758520

Hence the Semidiameter of the Orb equal to the mean Diſtance of ♀ à ☉ is *cm*, = *c* A 72182, the Eccentricity 573 and half, and the Longitude of the Aphelion 9ˢ. 26° 45′ 36″.

But raducing the curtate Diſtance to the true, and comparing theſe Obſervations with Mr. *Flamſteed's*, I find the mean Diſtance of ♀ à ☉ 72337, the Eccentricity 505, the Place of the Aphelion in the Firſt Obſervation 10ˢ. 6° 54′ 29″, in the ſecond, 10ˢ. 6° 56′ 0″, and in the third, 10ˢ. 6° 57′ 30″; the mean Anomaly in the Firſt Obſervation, 9ˢ. 4° 57′ 20″, in the ſecond, 4ˢ. 13° 40′ 43″, and in the third, 11ˢ. 16° 7′ 36″; the Elliptic Equation in the Firſt Obſervation, 47′ 47″ add; in the ſecond, 34′ 56″ ſubtract, and in the third, 11′ 25″ add.

CHAP.

CHAP. VI.

BY three Obſervations of the greateſt Elongations of *Mercury* from the Sun, I have found as follows.

					Place ⊖.					Elongat.		
	D.	h.	′		S.	°	′	″	*Log.* à ☉	°	′	″
1724 *Sept.*	18	6	20	I	00	06	43	22	5.000059	25	30	49
1725 *Febr.*	21	5	27	H	5	14	09	05	4.996895	27	23	14
1726 *Aug,*	13	6	57	G	11	01	10	15	5.004322	27	09	54

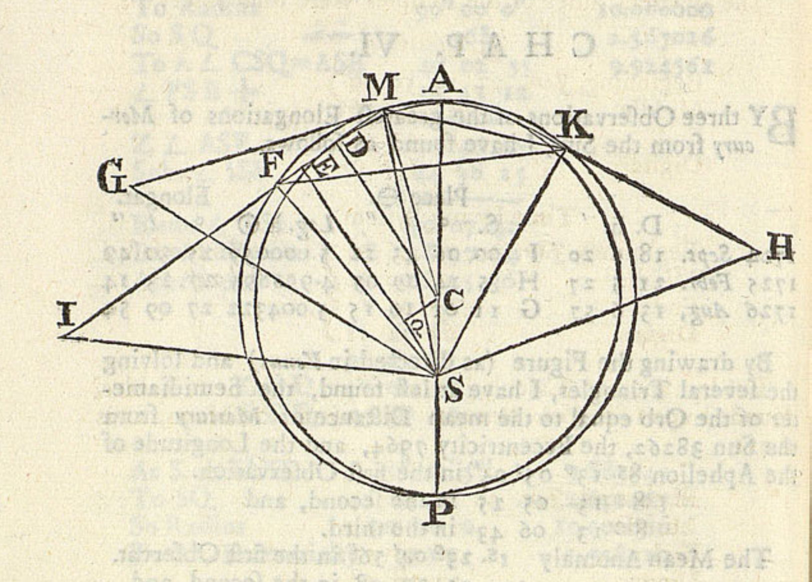
By drawing the Figure (as directed in *Venus)* and ſolving the ſeveral Triangles, I have at laſt found, the Semidiameter of the Orb equal to the mean Diſtance of *Mescury* from the Sun 38262, the Eccentricity 7964, and the Longitude of the Aphelion 8s. 13° 05′ 04″ in the firſt Obſervation.
8 13 05 25 in the ſecond, and
8 13 06 43 in the third.

The Mean Anomaly 1s. 23° 04′ 56″ in the firſt Obſervat.
11 01 20 08 in the ſecond, and
0 13 16 06 in the third.

The Elliptic Equation 16 07 00 in the firſt Obſ. ſub.
9 11 59 in the ſecond, add.
4 19 15 in the third, ſuh.

See the Scheme, and mark it well.

That



That the Obſervations of Eclipſes are the only means to get to a Truth of the times when they happen, is manifeſt, from the great pains I have taken, and the Care I have had both in the Obſervations and Calculations: For not one has eſcap'd my View theſe thirty four Years laſt paſt, that have been viſible in our Hemiſphere.

And for the ſatisfaction of the inquiſitive Reader, I will here inſert the Obſervation of the Lunar Eclipſe that happen'd the 22*d* of *January*, 1730, in the Morning, at *Bedford*-Coffee-houſe in *Covent-Garden*, *London*, in Company with ſeveral Reputable Gentlemen, and with exquiſite Inſtruments, *viz*. we had two Reflecting Teleſcopes, one of two, and the other of nine Feet long; a fine Quadrant, a Micrometer, and all other things for my purpoſe.

The

The apparent times of the Eclipses were thus observ'd:

	D.	h.	'	"	
Beginning, *Jan.*	22	14	50	00	P.M.
Middle		15	47	00	
End		16	43	8	
Digits		03	15	0	

Time by my System.

Beginning, *Jan.*	22	14	56	54	Clocks too fast 14' 24".
Middle		16	00	02	
End		17	03	10	
Digits		03	32	51	

But by another Calculation of mine, from new Tables, founded upon Sir *Isaac Newton*'s Theory of the Moon, it is thus:

Beginning, *Jan.*	22	14	56	45
Middle		15	53	19
End		16	49	53
Digits		03	08	18

Scientia Stellarum,

Beginning, *Jan.*	22	14	37	34
Middle		15	33	48
End		16	30	02
Digits		02	53	00

Weaver's Almanack.

Beginning, *Jan.*	22	14	40	52
Middle		15	41	48
End		16	42	44
Digits		03	16	48

Ladies Diary.

Beginning, *Jan.*	22	15	13
Middle		16	06
End		17	00
Digits		02	39

Tycho

Tycho Wing, in *Coley*'s Almanack, which, he ſays, is from Sir *Iſaac Newton*'s Theory of the Moon; but that is a miſtake, becauſe it is ſo vaſtly wide from Truth, that it will not bear the teſt.

He gives the ſame thus:

		°	'	"	
Beginning, *Jan.*	22	14	31	23	P. M.
Middle		15	29	40	
End		16	27	57	
Digits		03	06	00	

Here we ſee ſuch a Diſagreement in the time of this Eclipſe, given by ſeveral Authors above, that it is hard to be reconcil'd.

One tells us, his Numbers are from bright Tables, never yet made publick.

Another tells us, that his Calculations are from Sir *Iſaac Newton*'s Theory of the Moon; and therefore no body muſt queſtion the truth of them. Indeed, if it were ſo, not any one living would dare to queſtion them. But I deny the Aſſertion; and can prove, that his Calculation is not from Sir *Iſaac Newton*'s Theory.

CHAP.

CHAP. VII.

To determine the greatest Elongation of Mercury *and* Venus *from the* Sun.

THE Quantity of this Angle, that these two inferiour Planets make at the Earth, is what was never yet (that I know of) truly determin'd, but always given in gross. All the Writers of Astronomy, both ancient and modern, only tell us, that *Mercury* is never more than 28 or 29°, and *Venus* never more than 48° from the Sun.

I shall therefore in this place shew the true Quantity of their Elongations, both the greatest and least that ever can happen.

I have in the foregoing Chapter determined the Eccentricity of *Mercury* to be 7964 of the same Parts, of which the mean Distance is 100000. Now, because these Numbers are too large to be laid down by any Scale, I shall reduce them to such as may be laid down, thus:

Suppose the mean Distance of the Earth from the Sun to be 1000, the Aphelial Distance will be found in that Proportion thus:

As 101692 : 1000 : : 1692 : 16.6
Eccentricity 16.6

Radius 983.4 of the Earth's Orb.

2. For *Mercury*'s Aphelial Distance reduced, say,

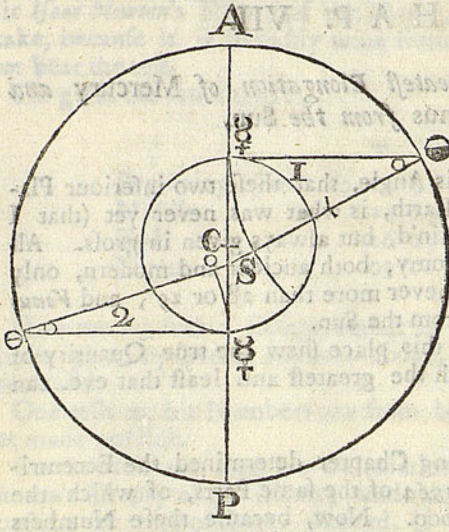
As 101692 : 1000 : : 46680 : 459.

3. For the Eccentricity of this reduced Orb, say,
As 46680 : 7964 : : 459 : 78.
78

Rem. Radius of ☿'s Orb 381.

Make

Make A o equal to 983.4 on the Line of Lines on the Sector, and ſweep the Circle A ⊖ P, for the Earth's Orb.



Draw PSA for the Aphelial Line of *Mercury* ; take 1000 from the Sector, as it now ſtands, and ſet it from A to S; take the Aphelial Diſtance of ☿ 549 from the ſame Lines on the Sector, and ſet it from S to ☿; towards A ; take 381 from the ſame Sector, and ſet it from ☿ to C, ſo is C, the Center of *Mercury*'s Orb.

Draw ⊖ ☿ a Tangent to the Orb, to cut the Aphelial Line at Right Angles in ☿ ; and draw S ⊖ ; ſo is the Angle ☿ ⊖ S the greateſt Elongation that *Mercury* can ever have ; becauſe the Aphelial Line of ☿, (which is the longeſt ſide of the Triangle) ſubtends the Angle at the Earth.

To the Perihelion of *Mercury* draw the Tangent ⊖ ☿, to cut the Perihelial Line at Right Angles in ☿ ; ſo is the Angle ☿ ⊖ S in the ſecond Triangle the leaſt Elongation that *Mercury* can have, whoſe Quantities are thus found.

For the greateſt Elongation.

In the Firſt Triangle there are known (ſuppoſing the Earth in Perihelion) the Logarithm of the Perihelial Diſtance of the Earth from the Sun = 4.992589. (2.) The Logarithm of *Mercury*'s Aphelial Diſtance = S ☿ 4.669131, to find the Angle ☿ ⊖ S ?

OPE-

OPERATION.

As S ⊖ Perihelion Diſtance	—		4.992589
To Radius	—	—	10.000000
So S ☿ Aphelion	—		4.669131
To S. ∠ ☿ ⊖ S. Elongat.		28° 21′ 8″	9.676542

2. For the leaſt in the Second Triangle.

As S. Earth's Aphelion	—	—	5.007286
To Radius	—	—	10.000000
So S ☿ Perihelion	—	—	4 487704
To S. ∠ S ⊖ ☿ Elongat.		17° 35′ 42″	9 480418

Secondly, To determine the greateſt and leaſt Elongation of *Venus* from the *Sun.*

When *Venus* and *Mercury* are at their greateſt Elongation from the Sun, they move with equal pace with our Earth for a ſmall time; and then a Line drawn from them ſeverally to the Earth will be a Tangent to their Orbits reſpectively; ſo that looking into an Ephemeris that has their Motions to Minutes, you may diſcover the Day of their greateſt Elongation from the Sun, by obſerving their equal pace with him. And by reaſon of the different Poſitions of our Earth at different times when theſe two Inferiours are at their greateſt Elongation, this Quantity will be always different; but is greateſt when the Planet is in Aphelion, and leaſt when in Perihelion; becauſe the Diſtance of the Planet from the Sun is the Side of the Triangle that ſubtends the Angle of Elongation, as is plain from the Demonſtrations hereunto annexed.

In the foregoing Chapter I have found the Eccenricity of *Venus* to be 505, and her Aphelial Diſtance to be 72838 of ſuch Parts as the mean Diſtance of Sun from Earth is 100000.

Now, to reduce theſe Numbers practicable on the Sector, I proceed as in *Mercury.*

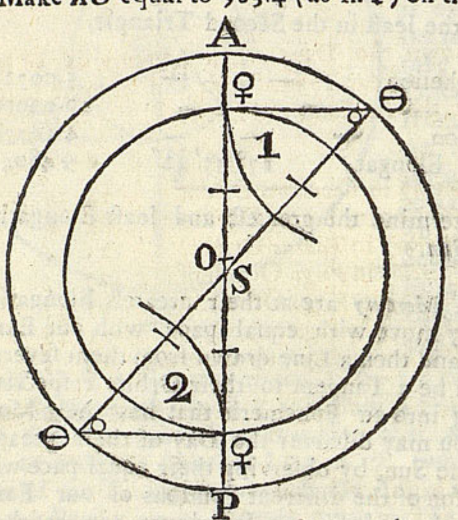
As 101692 : 1000 : : 72838 : 716, by which *Venus*'s Aphelial Distance is reduced to 716.

Now, for the Eccentricity of this reduced Orb, say,

As 72838 : 505 : : 716 : 5.
Eccentricity sub. 5

Rem. the Radius 711 of *Venus*' sOrb reduced.

Make AO equal to 983.4 (as in ☿) on the Line of Lines on the Sector, and draw the *Circle* A ⊖ P for the Earth's Orb; draw ASP for the Aphelial Line of *Venus*; take 1000 from the Sector as it now stands, and set it from A to S; take the Aphelial Distance of *Venus* 716 from the Line of Lines, & set it from S to ♀ towards A; then take the Radius of the Orb of ♀ 711. and set one Foot of the Compasses in ♀, the other will reach almost to S, the Center of the Orb, on which Center sweep *Venus*'s Orb; draw ♀ ⊖ a Tangent to the Orb, and compleat the Triangles, by joyning ⊖ and S; then is the Angle ♀ ⊖ S the greatest Elongation, and is thus found in the fisst Triangle:



As S *Earth*'s Perihelion	---	4.992589
To Radius	---	10.0000000
So S. *Venus*'s Aphelion	----	4.862359
To S. ∠ ♀ ⊖ S Elongat.	47° 38′ 35″	9.869770

Secondly, By compleating the second Triangle S ♀ ⊖, I proceed to find the least Elongation that *Venus* can have, thus:

As

As S *Earth*'s Aphelion		—	5.007286
To Radius	—	—	10.000000
So S *Venus*'s Perihelion		— —	4.856295
To S. ∠ S ⊖ ♀ Elongat.	44° 56′ 14″		9.849009

So that *Venus*'s Elongation is never more than 47° 48′ 35″, nor leſs than 44° 56′ 14″, in what part of its Orbit ſoever the Earth be.

I ſhall here ſet down the Days when *Mercury* is at his greateſt Elongation this Year 1734, with the Sign he is in, and the Quantity of the Angle at the Earth.

		°	′
1734.	*Jan.* 8. *Mercury* in *Capricorn* Osient.	24	36
	Mar. 22. *Mercury* in *Taurus* Occident.	19	2
	May 8. *Mercury* in *Taurus* Orient.	25	4
	July 19. *Mercury* in *Virgo* Occident.	27	17
	Sept. 1. *Mercury* in *Virgo* Orient.	17	44
	Nov. 12. *Mercury* in *Sagittary* Occid.	21	28
	Dec. 23. *Mercury* in *Sagittary* Orient.	23	5

And the ſame Year 1734, *Venus*'s Elongat. Max. à ☉ falls thus:

	°	′
Jan. 10. *Venus* in *Piſces* Occid.	46	59
Mar. 4. ℞ in 22° ♈		
June 2. *Venus* in *Taurus* Orient.	45	53

Here follow the Calculations of *Venus*'s Place in *Jan.* 1734, at the time when ſhe is at her greateſt Elongation from the Sun.

Equal Time.	Long, *Venus*. S. ° ′ ″	Anom. *Veuns*. S. ° ′ ″	Node *Venus*. S. ° ′ ″
Anno 1734.	2 00 53 7	3 23 49 27	2 14 15 27
January 10.	16 01 18	16 1 17	1
Hours 6.	24 2	24 02	
			2 14 15 28
Mean Motion	2 17 18 27	4 10 14 56	
Equation sub.	0 36 50		
Hel. Orb Place	2 16 41 37	Log. ♀ à ⊙ *Cur.*	- - - 4.857386
Node sub.	2 14 15 28	Log. ⊙ à *Earth.*	- - - 4993176
		° ′ ″	
Arg. Lat.	0 02 26 9	Tan. 36 11 07	- - - 9.864210
		Add 45 00 00	
Reduct. sub.	16		
		Ct.— 81 11 07	- - - 9.190532
Hel. Ecl. Place	2 16 41 21	*t.* — 67 32 53½	- - 10.383809
Sun's Place sub.	10 01 35 34	*t.* — 20 34 10	- - - 9.574341
Angle at Sun	4 15 05 47	Z 88 7 3½	Parallax. —
Half	2 07 32 53½		
		X 46 58 43½	Elongat. +
Parallax sub.	2 28 07 3½		
		Elongation at	Noon was
Geocentr. *Venus*	11 18 34 17½		46° 58′ 37″
Lat. N. A.	0 8 55		
Place of {	⊙ 9 { at	{ 10 0 19 19	♀ 11 17 17 35
	⊙ 10 { Noon.	{ 10 1 20 20	♀ 11 18 18 57
	Diurnal Mot.	— 1 1 1	1 1 22

Note,

Note, If the Diurnal or hourly Motion of an inferiour Planet be more than the Apparent Motion of the Sun, they are then short of the *Elong. Max.* ☉; but if less, past.

Here follows the Calculation of the Place of *Mercury* in the Evening of the Day of his greatest Elongation 1734; which, if it be clear, ☿ may be seen with the naked Eye a little after Sun-setting.

Equal Time.	Long. *Mercury.* S. ° ′ ″	Anom. *Mercury.* S. ° ′ ″	Node *Mercury.* S. ° ′ ″
Anno 1734,	4 22 19 58	8 9 6 44	1 15 15 40
July 20,	3 12 34 5	3 12 33 37	27
Hours 8,	1 21 51	1 21 51	
Min. 30,	5 6	5 6	1 15 16 7
Mean Motion	8 6 21 0		
Equation add	2 14 49	11 23 7 18	
Hel. Orb Pla.	8 8 35 49	☿ à ☉ in Orb..	- - 4.668762
Node sub.	1 15 16 7	Curt. sub.	- — 504
		☿ à ☉ in Ecl.	- - 4.668258
Arg. Lat.	6 23 19 42	☉ à *Earth*	- - 5.006292
		t. 24° 39′ 46″	- - 9.661966
Reduct. sub.	9 28	+ 45 00 00	
Hel. Ecl. Pla.	8 8 26 31	Ct. 69 39 46	- - 9.568964
Sun's Plare	4 8 13 14	t. 60 6 58½	- - 10.240500
		t. 32 48 58	- - 9.8 9464
Angle at ☉	4 0 13 17		
Half	2 0 6 38½	Z 92 55 36½	Parallax —
Parallax sub.	3 2 55 36½	X 27 17 40½	Elongat. +
Geocen, ☿	5 5 30 54½	Elongation at	Noon was
Lat. S. Ascen.	1 27 5		27° 18′ 6″

Diurnal Motion of ☉ from 19 to 20th Day at Noon is 5[illegible]′ 26″, from 20 to 21 at Noon, is 57′ 26″, of ☿ 58′ 43″, and 55′ 3″. By which 'tis plain, the greatest Angle at Earth was on the 20 Day.

By my Planetary Inſtruments you may lay down the Triangles at the times above-mentioned, which will greatly inform you of the true Theory of them: And becauſe Time (the common Devourer of all things) will render thoſe Inſtruments to err in *Saturn* 1° in 45 Years, in *Jupiter* 1° in 50 Years, in *Mars* 1° in 51 Years and half, in *Venus* 1° in 63 Years, and in *Mercury* 1° in 70 Years: Therefore, for the ſake of the Inquiſitive, I will here ſubjoyn a Table, by which new Inſtruments of all the Planets may be projected at pleaſure, making the Aphelial Diſtance 1000.

The Aphelions of the Planets, according to my Tables.

Saturn	♐	29	18	40	The laſt Day of the *Julian* Year at Noon 1733.
Jupiter	♎	10	54	35	
Mars	♍	1	12	59	
Earth	♑	8	19	11	
Venus	♒	7	3	30	
Mercury	♐	13	13	14	

Saturn 946 } Radius { *Saturn*'s Orb à Aph. Point to its Center,
Earth 100.84 } { *Earth*'s Orb Center à ☉ is 1.67.

Jupiter 954 } Radius { *Jupiter*'s Orb à Aphel. Point to its Center.
Earth 186 } { *Earth*'s Orb Center from ☉ is 3.

Mars 915 } Radius { *Mars*'s Orb à Aphel. Point to its Center.
Earth 611 } { *Earth*'s Orb Center à ☉ is 11.

Earth 983.4 } Radius { *Earth*'s Orb à Aphel. Point to its Center
Venus 716 } { *Venus*'s Orb Center à ☉ is 5.

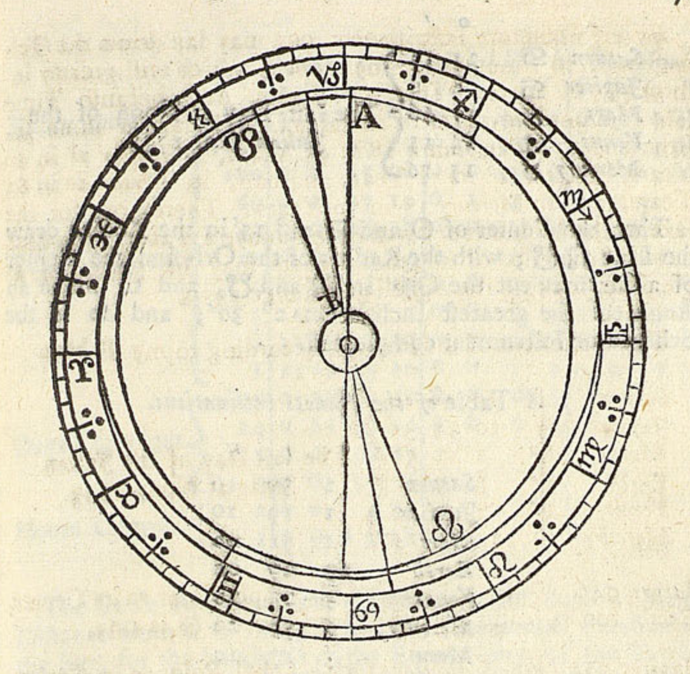
Earth 983.4 } Radius { *Earth*'s Orb à Aph. Point to its Center.
Mercury 459 } { *Mercury*'s Orb Center à ☉ is 78.

Or in *Venus* 716—5=711, the Radius of her Orb; and in *Mercury* 459—78=381, the Radius of his Orb.

Then to delineate the Inſtrument of *Saturn*, on the Center ☉ ſweep a Circle, and divide it into 12 Signs, as *per* Figure.

From ☉ draw a Line to the Place of this Aphelion ♐ 29° 19', which ſhall repreſent the Aphelial Line of *Saturn*.

Thro'



Thro' ⊙ draw a Line from the Place of the Earth's Aphelian ♑ 8° 19′, and it ſhall repreſent the Aphelial Line of the Earth.

Take the Radius of the Zodiac, and open the Sector to 10 on the Line of Lines; as the Sector now ſtands, take off 946 in your Compaſſes, and ſet it on *Saturn*'s Aphelial Line from A towards ⊕, and draw the Orb of *Saturn*.

Then take 100.84 (nearly 101) and ſet it from ⊙ on the Aphelial Line of ⊕ to B: Take 1,67 from the ſame Line of the Sector, and ſet it from ⊙ towards B, and it ſhall give the Center of the Earth's Orb as before; which Circle draw as is done in the Scheme, and that ſhall be the Earth's Orb truly proportion'd to the Orb of *Saturn* in his Theory.

The next thing to be done, is to draw the Ecliptic, which muſt be done from this Table of the Places of their Nodes.

		°	′	
Saturn	♋	21	15	The last Day at Noon of the *Julian* Year 1733.
Jupiter	♋	8	2	
Mars	♉	17	46	
Venus	♊	14	15	
Mercury	♉	15	16	

Thro' the Center of ☉ and ♋ 21° 15′ in the Zodiac draw the Line ☊ ☋ ; with the Radius of the Orb find the Center of a Circle to cut the Orb in ☊ and ☋, and to make an Angle of the greatest Inclination 2° 30′; and so is the Scheme or Instrument compleated.

A Table *of the Planets Inclinations.*

	°	′	″
Saturn	2	30	10
Jupiter	1	19	10
Mars	1	51	00
Earth	23	29	00
Venus	3	23	20
Mercury	6	59	20
Moon	5	17	20

CHAP. VIII.

1. *Of the Mean Motion of the Earth, her Aphelion, and the Recession of the* Equinox, *&c.*

THE last Day of *December* at Noon, under the Meridian of *London* 1700, Old Stile, the mean Place of the Earth was 3S. 20° 43′ 50″, the Place of the Aphelion was 9S. 7° 44′ 30″, and the Place of the first Star of *Aries* was 29° 0′ 10″. To which I shall prefix the middle Motions for Years compleat, as below.

Radix

		Long. *Earth.*				*Aphel. Earth*				*Recession.*			
		S.	°	′	″	S.	°	′	″	S	°	′	″
Radix *Anno*	1701	3	20	43	50	9	7	44	30	0	29	0	10
Year Compleat	1000	0	7	33	20	0	17	30	0	0	13	53	20
	100	0	0	45	20	0	1	45	0	0	1	23	20
	60	0	0	27	12	0	1	3	0	0	0	50	0
	40	0	0	18	8	0	0	42	0	0	0	33	20
	20	0	0	9	4	0	0	21	0	0	0	16	40
	4	0	0	1	49	0	0	4	12	0	0	3	20
	3	11	29	17	0	0	0	3	9	0	0	2	30
	2	11	29	31	20	0	0	2	6	0	0	1	40
	1	11	29	45	40	0	0	1	3	0	0	0	50
Days Compleat	30	0	29	34	10	0	0	0	5				4
	24	0	23	39	20	0	0	0	4				3
	2	0	1	58	17								
	1	0	0	59	8								
Hours Compl.	2	0	0	4	56								
	1	0	0	2	28								

The Sun's Apparent Semidiameter at the Earth's Mean Diſtance from it is 16′ 5″, and the Horizontal Parallax of the Sun, for the Smallneſs of the Eccentricity of the Earth's Orb, and the Smallneſs of its own Quantity, may be always ſtated 10″.

2. *To Calculate the Mean Place of the* Earth, *and her Aphelion, and thence the Mean Anomaly, to any given Time.*

1. If the given Time be after the Year 1701, take the Mean Place for 1701 Current, from the foregoing Table, which I call the *Radix*.

2. To the Radical Place, add the Mean Motions for the Years, Months, Days, Hours, Minutes and Seconds Compleat, this Sum is the Mean Motion, or Place ſought.

N. B. The true Length of the Solar Year being 365 D. 5 h, 49′ 2″ 15‴, the Mean Motion of the Earth to any Months and Days may be known, by ſaying, If the Length of the Solar Year give 360°, What will the Days from the firſt of *January*, to the Day propoſed, give? (For this purpoſe, ſee the

the Table in my *Satellite Astronomy*, Page 94.) And for the Mean Motion of the Aphelion, to any Day in the Year, say, As the Length of the Solar Year 365 D. 6 h. 49′ 2″ 15‴, To 63″, So are the Days from the first of *January*, to the Day proposed, To the Motion of the Earth's Aphelion: Minding in Leap-Year to add the Motion of a Day more.

Lastly, Subtract the Mean Place of the Aphelion, from the Mean Longitude of the Earth, and there will remain the Mean Anomaly.

Note, If the Time be before 1701, subtract the Mean Motion from the Time proposed, to 1701, from the Radical Place; then work as before is taught.

Example. Let it be required to find the mean and true Place of the Earth, her Aphelion and Mean Anomaly for *April* 29, at Noon, in the Year 1726?

First, The Days from the first of *January*, to *April* 29, inclusive, are 119 Days. Then,

	D.	h.	′	″	‴	°		D.	S.	°	′	″	
As	365	5	49	2	15 :	360 : :		119 :	3	27	17	32	Long.
And As	365		49	2	15 :	63	: :	119 :	20″.				

Now see the Work.

		Longit. *Earth*.				Aphel. *Earth*.			
		S.	°	′	″	S.	°	′	
Radix	1701	3	20	43	50	9	7	44	30
Years	20	0	0	9	4	0	0	21	00
	4	0	0	1	49			4	12
	1	11	29	45	40			1	03
April 29		3	27	17	32				20
Mean Place *Earth*		7	17	57	55	9	8	11	05
Aphelion sub.		9	8	11	5				
Mean Anomaly		10	9	46	50				

3. Given the Earth's Mean Anomaly, to find the Angle at the upper *Focus* of the Earth's Ellipsis.

To

To the Constant Logarithm 89·3909656, add the Sine of twice the Mean Anomaly; the Sum will be the Logarithm of the Decimal Parts of a Minute; which being subtracted from the Mean Anomaly in the first and fourth Quadrants of the Orb, but added in the second and third, gives the Angle at the upper *Focus*.

Example. Let it be required to find the Angle at the upper *Focus* in the foregoing Case, where the Mean Anomaly is $10^{s}.\ 9^{\circ}\ 46'\ 50''$?

OPERATION.

	S.	°	'	"		
Mean Anom. *Earth*	10	9	46	50		
Double	8	19	33	40		
Complement		79	33	40	Sine	9·9927517
Constant Logarithm		----				89.3909656
The Logarithm of		2419				99·3837173
		60				
Seconds		14,5140	subt.			
Mean Anomaly	10	9	46	50		
Angle at upper *Focus*	10	9	46	35		

4. Given the Angle at the upper *Focus*, to find the true Anomaly, and so the Earth's Place in her Orbit, and consequently the Sun's Place in the Ecliptic.

To the Constant Logarithm 9·9852994, add the Tangent of half the Angle at the upper *Focus*, and you will have the Tangent of half the true Anomaly.

And here observe, that if the half of the Angle at the upper *Focus* be more than a Quadrant, then take the fourth proportional Tangent from 180°, and the double of the Remainder is the true Anomaly.

Then to the true Anomaly add the Place of the *Aphelion*, and you have the Earth's true Place in her Orbit; to which add Six Signs, and you will have the Sun's true Place in the Ecliptic.

Ex-

Example. Let the Sun's Place be required to the time above, when the Angle at the upper *Focus* was 10s. 9° 46′ 35″?

OPERATION.

	S.	°	′	″		°	′	″
Angle at the upper Focus	10	9	46	35	Compl.	50	13	25
Half	5	4	53	17.5				
Complement	0	25	6	42.5	t.	9.6708815		
Constant Logarithm						9.9852934		
Sum, is the Tangent of		24	22	27		9.6561749		
From		180	0	0				
Rem. half true Anom.		155	37	33				
True Anomaly		311	15	6	=	10 11	15	6
Aphelion add						9 8	11	5
Earth's true place						7 19	26	11
Add						6 2	0	0
Sun's true place						1 19	26	11

5. To find the Elliptic Equation

The Difference between the Mean Anomaly and the True, is the Elliptic Equation, which is to be subtracted from the Mean Longitude in the Six first Signs of Mean Anomaly, and added in the other Six; the Sum or Difference is the true Place of the Earth: So in the preceding.

	S.	°	′	″
Example, the Mean Anomaly is	10	9	46	50
The trne Anomaly is	10	11	15	6
Elliptic Equation add		1	28	16

After this manner is the Sun's Equation in the Table of my *Compleat System*, Pages 28, 29, Calculated.

Mean

	S	°	′	″
Mean Longitude of the Earth	7	17	57	55
Ecliptic Equation add		1	28	16
Earth's true Place as before	7	19	26	11

6. Given, the Angle at the upper *Focus*, and the true Anomaly, to find the Logarithm of the Diſtance of the Earth from the Sun; ſuppoſing the Logarithm of the mean Diſtance to be 10.0000000. = AC = CP = ☉G in the Scheme, Page 15.

Rule. Take the Sum and Difference between the true Anomaly and the Angle at the upper *Foues*, and alſo the half of the Sum and Difference; then to the Sine of the Angle at the upper *Focus* add the Exceſs of the Co-Secant above the Radius of the half Sum found above, and the Secant above the Radius of the half Difference; the Sum of theſe three will be the Logarithm of the Diſtance of the Earth from the Sun ſought.

But to have it agree to the Mean Diſtance of 100000, as in my Solar Tables in my *Syſtem*, take half of the Charactariſtick, and 'tis done. Let the Example be as above.

	S	°	′	″		
True Anomaly	10	11	15	6		
Angle at upper Focus	10	9	46	36	Sine	9.885650
Sum	8	21	1	41		
Half	4	10	30	50 ½	Co-Sec.	0.119061
Difference		1	28	31		
Half		0	44	15 ½	Sec.	0.000036
The Logarithm Diſtance Sought = ☉K						10.004747
Half Charact. is Loarithm in my Tables						5.004747

But when the Earth is very near her Aphelion, to the Conſtant Logarithm 85. 1748215 add twice the Sine of half the Angular Diſtance of the Earth from her Aphelion, and you will have the Logarithm of a Number, which taken from the Conſtant Logarithm 10.007289, gives the Logarithm Diſtance ſought.

Ex

Example. June 18, 1732 at Noon, the Sun's Place is in ♋ 7° 48′ 8″ and the M. Anom. 11s. 29° 29′ 36″

Earth's Distance from the Aphelion	30	24		
Half	15	12	Sine	7.645423
Double Sine				15.290846
Constant Logarithm add				85.174822
Subtract			$\frac{1}{2}$	0.465668
Constant Logarithm			10.007289	
Dist. ♁ à ☉ as in my Tables			5.007286	

2. And when the Earth is very near (or within 5° of) her Perihelion, then to the Constant Logarithm 85.159911 add twice the Sine of half the Angular Distance from the Perihelion, and you will have the Logarithm of a Number; which added to the Constant Logarithm 9.992587, gives the Logarithm-Dist. sought.

Then take half the Characteristick, and it will be the Logar. Dist. ♁ à ☉ in my Solar Table.

Example December 18, 1732, at Noon, the Earth's Place is ♋ 8′ 9′ 14″ and her mean Anom. 5s. 29° 51′, 26″; what's the Logarithm of her Distance from the Sun?

OPERATION.

	S	°	′	″		
Mean Anomaly	5	29	51	26		
Distance from the Perihelion			8	34		
Half			4	17	Sine	7.076577
Double Sine						14.153154
Constant Logarithm						85.159911
And the Number				$\frac{1}{2}$		313065
To the Constant Logarithm			9.992587			
Dist. ♁ from ☉			9.992589			
Nearest half Charactaristick			4.992589	in my Tables.		

7. Given, the Logarithm Distance of the Earth from the Sun, to find the apparent Semidiameter of the Sun?

Rule;

Rule. From the Constant Logarithm 11.2063672, take the Logarithm Distance of the Earth from the Sun, and the Remainder is the apparent Semidiameter in Minutes and Decimal Parts.

Example. Anno 1726, *April* 29, at Noon, I demand the Sun's apparent Semidiameter?

OPERATION.

Constant Logarithm	----	11.2063671
Logarithm of *Earth* from *Sun* sub.		10.0047470
Sun's Semidiameter 15'.91		1.2016201
60		
54 60 = 15' 55"		

Example 2. *Anno* 1732, *June* 18, Const. Logar. 11.206367
Logarithm-Distance *Earth* from *Sun* 10.004286
Suns Appar. Semidiameter 15' 81 1.199081
60

15 48 60 = 15' 49"

Example 3. *Anno* 1732, *June December* 18, Const.
Logarithm 11.206367
Logar. Dist. *Earth* from *Sun* subt. 9.992589
Sun's Appar. Semidiameter 16' 36 1.213778
60

21 60 = 16' 22"

8. Given, the Logarithm-Distance of the *Earth* from the *Sun*, to find the Apparent hourly Motion of the Sun.

Rule, From the Constant Logarithm 20.3116407 subtract twice the Logarithm-Distance of the *Earth* from the *Sun*, and the Remainder will be the Logarithm of the Apparent hourly Motion of the Sun in Minutes and Decimal Parts.
Example. Anno 1726, *June* 29, at Noon.

Constant Logarithm		20.3916407
Twice Logar. Dist. *Earth* from *Sun* Sub.		20.0094940
Sun's Appar. hourly Motion	2′.411	0.3821467
	60	

24.660 = 2′ 25″.

Example 2. Let the Sun's true place, his hourly Motion and Apparent Semidiameter be sought *February* 14. 1732 at Noon: Because 'tis Leap Year, the days from *January* 1, to *February* 15 Inclusive are 46.

	D.	h.	′	″	‴		D.	S.	°	′	″	
As	365	5	49	2	15 :	360° : :	46 :	1	15	20	23	Longitude,
As	365	5	49	2	15 :	63″ : :	46 :				7	Apogeon.

Now

Now ſee the Work; and mark it well.

		Long. *Earth.* S. ° ' ''	Aph. *Earth* S. ° ' ''	
				Conſ. 11.2063671
				9.9959882
Radix	1701	3 20 43 50	9 7 44 30	16'.23 1.2103791
	20	0 00 09 04	21 00	60
Years Compleat	4	0 00 01 49	4 12	13,80
	3	11 29 17 00	3 9	☉Sem. 16' 14''
	2	11 29 31 20	2 6	
	1	11 29 45 40	1 3	Conſ.20.3916407
	1	11 29 45 40	1 3	Sub. 19.9919760
Feb. 14. Biſſextile		1 15 20 23	7	2.51 0.3996647
Mean Place *Earth*		5 04 34 46	9 8 17 10	60
Aphelion ſub.		9 08 17 10		30.60
Mean Anomaly		7 26 17 36		Hor. Mot. 2' 31''
Doubled		3 22 35 12		
Complement		2 07 24 48	Sine — —	9.9653426
Equ add to M, Ano.		14	Conſt.Log.	89.3909656
∠ at upper Focus		7 26 17 50	2272	89.3563082
			60	

Half	3 28 8 55	13.6320	Equat. add.
Complement	2 1 51 5	*t.* 10.2716129	
Conſtant Logar.		9.9852934	
Tangent ſub.	61 2 12	10.2569063	
From	180 0 0		

118 57 48 ⎛7ˢ. 27° 55' 36'' True Anom.
30) 237 55 36 ⎝9 8 17 10 Apog. add.

Elliptic Equat. add 1° 38' ♁ 5 6 12 46 ⎫ true Place.
☉ 11 6 12 46 ⎭

True Anom	7ˢ. 27° 55' 36''		
∠ at up. Focus	7 26 17 50	Sine	9.9200853
Z	3 24 13 26		.0758588
X half	1 27 6 43	Co. Sec.	.0000439
Half	1 37 46		
Half	0 48 53	Sec.	4.9959880 Log. ☉ à ♁.

CHAP. IX.

To Calculate the true Place of the Moon *more exact than was ever yet done.*

1. BY the last Chapter, (or by the Fourth Precept of my *Compleat System*) find the Sun's true Place to the Equal Time given, with the Logarithm of its Distance from the Earth.

2. To the same Time, collect the middle Motions of the Moon's Longitude, Apogeon and Node, from the Tables in my *Satellite Astronomy*, as is usually done.

3. With the Mean Anomaly of the Sun, enter the Table of the Annual Equations of the Moon; and take out the Equations of the Moon's Longitude, Apogeon and Node, which apply to the mean Place of the Moon above found, as the Tables direct, and you will have the middle Places of the Moon's Longitude, Apogeon and Node clear'd off the Annual Equations.

4. From the Place of the Sun, subtract the Place of the Moon's Apogeon first Equated, and the Remainder is the Annual Argument; with which enter the Table of Equation the Second, and there take out the second Equation of the Moon; which applying to her Place first Equated, gives her Place the second time Equated.

5. From the Place of the Sun, take the Place of the Moon's North Node first Equated; and this Remainder is the Annual Argument of the Node. With this take out the third Equation, and apply it to the Moon's Place, the second time Equated, gives her Place Equated the third time.

6. From the Place of the Sun, take the Place of the Moon the third time Equated. And from the Place Sun's Apogeon, take the Place of the Moon's Apogeon the first time Eqnated; the Sum of these two Remainders call the

Ar-

Argument of the fourth Equation; with this enter the Table of the Fourth Equation; and that anſwering, apply to the Moon's Place the third time equated, gives her Place the 4th time Equated.

7. With the annual Argument (as found in the Fourth hereof) enter the Table, entituled *A Table of the Second Equation of the Moon's Apogeon, and Logarithm of the Eccentricity of her Orb*, and there take out the Second Equation, which apply to the Apogeon firſt Equated, gives its Place Equated the ſecond time, which is its true Place.

Alſo out of the ſame Table take the Logarithm of the Eccentricity, and reſerve it till anon.

8. From the fourth Equated Place of the Moon, ſubtract the true Place of the Apogeon, and the Remainder is the Moon's Mean Anomaly at that time.

9. To find the *Angle* at the upper Focus of the Ellipſis.

1. To the Conſtant Logarithm 72,933542, add twice the Logarithm of the Eccentricity, and the Sine of twice the Mean Anomaly, and you will have the Logarithm of ſome Minutes, which ſhall

be { added to / ſubtracted from } the Mean Anomaly, when its Double

is { leſs / greater } than 6 Signs

2. To the Conſtant Logarithm 43.359870 add thrice the Logarithm of the Eccentricity, and thrice the Sine of the mean Anomaly, and you will have the Logarithm of ſome Minutes to be added to the mean Anomaly, if leſs than 6 Signs; but to be ſubtracted, if more; the Sum or Difference is the Angle at the upper Focus of the Ellipſis, which the Moon's Orb forms at that time.

Note, In the firſt of theſe, the Characteriſtick will generally be more than 100, which always reject, and enter the Table of Logarithms with 0 for the Characteriſtick, and then the Minutes will be under 10: But in the ſecond Part it is the Logarithm of the Decimal of a Minute. See theſe two Examples:

 N.B.

N B. Always put two Cyphers before the second, as *per* Work.

		Logar.		Logar.
	1.507+	0.178114	2.6+	—0.414839
	.006—	97.801979	.007	+96.843904
Min.	1.501+		'2.607+	
	60		x 60	
Second,	30.360		''36.420	

10. Seek the Logarithm of the Eccentricity in the Tables of Artificial Tangents, and subtract its corresponding Arch from 45°, and to the Tangent of the Remainder add the Tangent of half the Angle at the upper Focus, and you will have the Tangent of half the true Anomaly.

Note, When the half of the Angle of the upper Focus is more than a Quadrant, then take the fourth proportional Tangent from 180°, and the double of the Remainder is the true Anomaly. The Focus of the Ellipsis of the Moon is shewn in the Scheme, Page 15.

11. To the true Anomaly add the true Place of the Apogeon, and that gives the Place of the Moon the fifth time Equated. Or, take the Difference between the mean Anomaly and the true, and you have the Elliptic Equation; which apply to the fourth Equated Place of the Moon, gives her Place Equated the fifth time, as before.

12. The Variation is best found, as shewn in Page 18. of my *Satellite Astronomy*.

But, however, you may do it thus: Subtract the Sun's Place from the fifth Equated Place of the Moon, and with the Distance enter the Table of Variation, and apply it to the 5th Equated Place of the Moon, gives the Place the 6th time Equated.

13. *Lastly*, Subtract the Sun's true place from the 6th Equated place of the Moon, and with that Remainder enter the Table of the seventh Equation, and take it out answering. Apply this Equation as the Table directs, to the *Moon's* sixth Equated place, and you have her true place in her Orbit.

14.

14. To find the Moon's Latitude and Ecliptic place.]

With the Annual Argument of the Node (as found by the fifth Article hereof.) Enter the Table for computing the Moon's Latitude, and take out the Equation of the Node; which apply (according to its Title) to the first Equated place of the Node, gives its true place.

Alſo out of the ſame Table take the Logarithm-Sine of the Inclination of the Moon's Orb to the Ecliptic: For that is accommodated to the Greateſt 5° 17′ 20″ Sine 8.964625 in the Conjunction and Oppoſition; and alſo to the Leaſt 4° 59′ 35″ Sine 8.9396935 Inclination in the Quadratures of the Nodes from the Sun; and then ſay,

As Radius
To the Sine of the Inclination,
So is the Sine of the Diſtance of the Moon from the neareſt Node,
To the Sine of her preſent Latitude, which

is { North Aſcending } if Arg. { 0 1 2 } Signs
{ North Deſcending } Lat. be { 3 4 5 }

And { South Aſcending } if Arg. { 6 7 8 } Signs.
{ South Deſcending } Lat be { 9 10 11 }

The Work for the firſt Example ſtands thus:
As Radius — — 90 ·· 0 ·· 10.000000
To the Sine of the Inclination;
So is the Sine ☽ from neareſt Node,
To Sine Latitude.

15. The Table of Reduction is accommodated to the Mean Inclination of the Lunar Orbit; that is, when the Sun is in the Octants, or 45° Diſtant from the Moon's Nodes; ſo that entring with the Argument of Latitude, you may take out the Reduction anſwering, and apply it to the Orbit Place of the Moon, gives her Place reduced to the Ecliptic: But to have the Reduction perfectly true, it will be beſt to ſay,

As Radius,
To CS of the Inclination of the Lunar Orbit;
So Tangent of the Argument of Latitude,
To the Tangent of an Arch, which ſubtracted from the Arg. of Lat. leaves the Reduction, which apply to the mean Orbit Place, as above, gives her Ecliptic Place.

First Example *of the* SUN's *Place.*

Equal time	Long. ☉				Anom. ☉				An. Argum.				*This belongs to the Moon.*			
	S.	°	'	"	S.	°	'	"	S.	°	'	"				
Anno 1731	9	20	27	52	6	12	11	51	1	27	20	5	1 ☉	27	20	5
May 7	4	5	10	37	4	5	10	6	4	13	26	58	6 ☽	27	54	2
Hours 10			24	38			24	38	9	13	53	7	6	29	26	3
Mean Mor.	1	26	3	7	10	17	46	35					10	24	49	34
Equat. add		1	16	58									5	25	15	27
					Log. 5.005462								Arg. 4. Equat			
☉'s tr. Place	1	27	20	5												

Second Example *of the* SUN's *Place.*

Equal time	Long. ☉				Anom. ☉				An. Argum				*This belongs to the Moon.*			
	S.	°	'	"	S.	8	'	"	S.	°	'	"				
Anno 1734	9	20	44	1	9	12	24	50	6	4	4	51	6 ☉	4	4	51
Septemb. 16	8	15	16	57	8	15	16	13	8	29	39	32	6 ☽	3	19	46
Mean Mot.	6	6	0	58	2	27	41	3	9	4	25	19	0	0	45	5
Fquat. ſub.		1	56	7									6	8	40	23
☉'s tr. Place	6	4	4	51	*Log.* 5.000420								6	9	25	28
													Arg. 4. E qu			

First Example *of the* Moon's *Place.*

Equal time.		Long. ☽. S.	°	′	″	Apog. ☽. S.	°	′	″
Anno	1731	10	29	5	46	3	29	2	1
May —	7	7	23	24	5		14	8	56
Hours	10		5	29	25			2	47
Mean Motion		6	27	59	18	4	13	13	44
1 Equation sub.				7	48		+	13	14
☽ Equated		6	27	51	30	4	13	26	58
2 Equation add				1	45		6	58	22
Moon Equated		6	27	53	15	4	6	28	36
3 Equation add					47	L.Ec.8.653279			
Moon Equated		6	27	54	2	Db.17.306558			
4 Equation add					15	Tr.25.959837			
Moon Equated		6	27	54	17	2 34 37 8.655279			
Apogeon sub.		4	6	28	36	45 0 0			
Mean Anom.		2	21	25	41	42 25 23: 9.960882			
Double		5	12	51	22	4 043 05: 9.934873			
Complement		0	17	8	38	38 11 19: 9.893755			
Equat. + to M. An.					30	76 22 38 Anom.			
Angle upper Focus		2	21	26	11	S Inclin. 5°9′4″ 8.95321			
Half —		1	10	43	5	S ☽ à ☊ 76°31′41″ 9.98786			
True Anomaly		2	16	22	38	S.Lt.SD 5 0 33 8.94109			
Apogeon add		2	10	28	36	For the Reduction.			
Moon Equated		6	22	51	14	As *Rad.* 90 0 0 10,000000			
Variation sub.				32	49	To C.*S.Inc.* 5 9 4 9.998242			
Moon Equated		6	22	18	25	So *t.* *A.Lat.* 76 31 41 10.620584			
7 Equation sub.				1	20	To *t.* — of 76 28 31 10.618826			
Moon in her Orb		6	22	17	5	Reduction 0 3 10 add			
Node sub.		9	8	48	46				
Arg. Latit.		9	13	28	19				
True Lat. S.D.			5	0	33	*Ellipt. Equat.* 5° 3′ 3″ sub.			
Reduction add				3	10				
Ecliptic Place		6	22	20	15				

First

First Example *of the* Moon's *Place.*

Node ☽. S. ° ′ ″		
9 17 9 33	Const. Log.	72.933542
6 43 31	° ′ ″	17.306558
1 19	17 8 38	9.469487
— 6 44 50	′. 5124 +	99.709587
9 10 24 43		43.359870
— 6 17	° ′ ″	25.959837
9☊10 18 26	81 25 41	29.985363
1☉27 20 5	.002019	99.305070
4 17 1 39	.514319	
	×60	
⊥ 1 29 40	30.865140 +	
9 8 48 46	6 ☽ 22 51 14	
	1 ☉ 27 20 5	
	4 25 31 9	
	Arg. 6 Equat.	
	6 ☽ 22 18 25	
	1 ☉ 27 20 5	
	4 24 58 20	
	Arg. 7 Equat.	

Second Example of the Moon's Place.

Equal time.	Long. ☽ S. ° ' "	Apog. ☽ S. ° ' "	
Anno 1724	0 10 25 33	3 1 8 13	
September 16	5 22 41 10	0 28 51 17	
Mean Motion	6 3 6 43	8 29 59 30	
1 Equation	ſub. 11 48	add 19 58	
☽ equated	6 3 18 31	8 29 39 32	
2 Equation	ſub. 34	add 2 22 13	
Moon equated	6 3 19 5	8 27 17 19	
3 Equation	ſub. 41	L. Ecc. 8.638505	
Moon equated	6 3 19 46	Doub. 17.277010	
4 Equation	— 23	Trip. 25.915515	
Moon equated	6 3 19 23	*t.* 42 30 32	9.962187
Apog. ſub.	8 27 17 19	*t.* 41 59 8	9.954217
Mean Anom.	9 6 2 4	*t.* 39 31 9	9.916404
Double	6 12 4 8	180 0 0	
Equ.ſub. à *M. A.*	20	140 28 51	
∠ upper Focus	9 6 1 44	280 57 42	True Anom
Half —	4 18 0 52		
Complement	1 11 59 8		
True Anomaly	9 10 57 42		
Apogeon add	8 27 17 19	S.Incl. 5° 12' 29"	8.95797
Moon equated	6 8 15 1	S.☽ à ☊ 25 52 57	9.640011
Variation	ſub. 5 6	S.Lt. *S.D.* 2 16 16	8.597981
Moon equated	6 8 20 7		
7 Equation	add 10	As Rad. 90 00 0	10.000000
☽ in her Orb	6 8 19 57	*To C.S.Inc.* 5 12 29	9.998203
Node ſub.	7 4 12 54	So *t.A.Lt* 25 52 57	9.685918
Arg. Lat.	11 4 7 3	To *t.* of 25 52 57	9.684121
TrueLat. S. D.	2 16 16	*Reduction* 0 5 35	
Reduction add	0 5 35		
Ecliptic Place	6 8 25 32	Ellip.Eq. 4 55 38 add	

Second Example of the Moon's *Place.*

Node ☽ S.	°	′	″
7	19	7	13
	13	42	56
7	5	24	17
	add	9	29
7 ☋	5	33	46
6 ☉	4	4	51
10	28	31	5
	12	29	28
	45	00	00
	42	30	32
Equ.—	1	20	52
7 ☋	4	12	54

Conft. Log	72.933542
	17 277010
12° 4′ 8″ —	9.320328
′. 3395 —	99.530880
	43.359870
	25.915515
83° 57′ 56″	29.993760
.001859 —	99.269145
·341359 Z —	
60	
″20.481540 —	
6 ☽ 8 15 1	
6 ☉ 4 4 51	
0 4 10 10	
6 ☽ 8 20 7	
6 ☉ 8 4 51	
0 4 15 16	

A Table *of the first, or Annual Equation of the* Moon.

Mean Anomaly of the Sun.

Anom. ⊙	Sign 0						Sign 1						Anom. ⊙
	Long. ☽ add		Apog. sub.		Nod. add		Long. ☽ add		Apog. sub.		Node add		
	′	″	′	″	′	″	′	″	′	″	′	″	
0	0	1	0	0	0	0	5	47	9	49	4	40	30
1	0	12	0	20	0	9	5	58	10	7	4	48	29
2	0	24	0	41	0	19	6	9	10	24	4	57	28
3	0	36	1	1	0	29	6	19	10	42	5	5	27
4	0	48	1	22	0	39	6	29	10	59	5	13	26
5	1	00	1	42	0	48	6	39	11	16	5	21	25
6	1	12	2	3	0	58	6	49	11	33	5	29	24
7	1	24	2	23	1	8	6	59	11	49	5	37	23
8	1	36	2	43	1	18	7	9	12	6	5	45	22
9	1	48	3	4	1	27	7	19	12	22	5	53	21
10	1	59	3	24	1	37	7	28	12	39	6	0	20
11	2	11	3	44	1	46	7	37	12	55	6	8	19
12	2	23	4	4	1	56	7	46	13	10	6	15	18
13	2	35	4	24	2	5	7	55	13	26	6	22	17
14	2	46	4	44	2	15	8	4	13	41	6	30	16
15	2	51	5	4	2	24	8	13	13	56	6	37	15
16	3	10	5	24	2	34	8	22	14	10	6	44	14
17	3	22	5	44	2	43	8	31	14	25	6	50	13
18	3	34	6	3	2	53	8	39	14	39	6	57	12
19	3	46	6	23	3	2	8	47	14	53	7	4	11
20	3	57	6	43	3	11	8	55	15	7	7	11	10
21	4	2	7	2	3	20	9	3	15	21	7	17	9
22	4	20	7	21	3	29	9	11	15	33	7	23	8
23	4	31	7	40	3	38	9	19	15	46	7	29	7
24	4	42	7	59	3	47	9	27	15	58	7	35	6
25	4	53	8	18	3	56	9	34	16	11	7	41	5
26	5	4	8	36	4	5	9	41	16	23	7	46	4
27	5	15	8	54	4	14	9	47	16	35	7	52	3
28	5	26	9	13	4	23	9	54	16	46	7	58	2
29	5	37	9	31	4	31	10	1	16	57	8	4	1
30	5	47	9	49	4	40	10	7	17	8	8	9	0
	sub.		add		sub.		sub.		add		sub.		
	Sign 11						Sign 10						

A Table *of the first, or Annual Equation of the* Moon.

Mean Anomaly of the SUN.

Anom. ⊙	Sign 2 Long. ☽ add ′ ″	Sign 2 Apog. sub. ′ ″	Sign 2 Node add ′ ″	Sign 3 Long. ☽ add ′ ″	Sign 3 Apog. sub. ′ ″	Sign 3 Node add ′ ″	Anom. ⊙
0	20 7	17 8	8 9	11 49	20 0	9 30	30
1	10 14	17 19	8 14	11 49	20 0	9 30	29
2	10 20	17 29	8 19	11 49	20 0	9 30	28
3	10 26	17 39	8 24	11 48	19 59	9 30	27
4	10 31	17 48	8 28	11 48	19 58	9 29	26
5	10 37	17 38	8 32	11 47	19 57	9 29	25
6	10 42	18 7	8 36	11 47	19 56	9 28	24
7	10 47	18 16	8 40	11 45	19 54	9 27	23
8	10 52	18 24	8 44	11 44	19 51	9 26	22
9	10 56	18 32	8 48	11 42	19 49	9 25	21
10	11 1	18 39	8 52	11 41	19 46	9 24	20
11	11 5	18 46	8 55	11 39	19 42	9 22	19
12	11 9	18 53	8 58	11 36	19 38	9 20	18
13	11 14	19 0	9 2	11 34	19 34	9 18	17
14	11 19	19 6	9 5	11 31	19 30	9 16	16
15	11 22	19 12	9 7	11 29	19 25	9 14	15
16	11 25	19 18	9 10	11 25	19 20	9 12	14
17	11 28	19 23	9 12	11 22	19 14	9 9	13
18	11 30	19 28	9 15	11 19	19 8	9 6	12
19	11 32	19 33	9 17	11 15	19 2	9 3	11
20	11 35	19 37	9 19	11 11	18 55	8 59	10
21	11 38	19 41	9 21	11 6	18 48	8 56	9
22	11 40	19 44	9 22	11 2	18 41	8 52	8
23	11 42	19 48	9 24	10 58	18 33	8 49	7
24	11 43	19 51	9 25	10 53	18 25	8 45	6
25	11 45	19 53	9 26	10 48	18 17	8 41	5
26	11 46	19 55	9 27	10 43	18 8	8 37	4
27	11 47	19 57	9 28	10 38	17 59	8 33	3
28	11 48	19 58	9 29	10 32	17 50	8 28	2
29	11 48	19 59	9 29	10 36	17 40	8 23	1
30	11 49	20 0	9 30	10 21	17 30	8 19	0
	sub.	add	sub.	sub.	add	sub.	
	Sign 8			Sign 7			

A Table *of the first, or Annual Equation of the* Moon

Mean Anomoly of the SUN.

Anom. ☉	Sign. 4. Long. ☽ add ′	″	Apog. sub. ′	″	Node add ′	″	Sign 5. Long. ☽ add ′	″	Apog. sub. ′	″	Node add ′	″	Anom. ☉
0	10	21	17	30	8	19	6	0	10	11	4	50	30
1	10	15	17	20	8	14	5	49	9	52	4	41	29
2	10	7	17	9	8	9	5	38	9	33	4	32	28
3	10	1	16	58	8	4	5	27	9	15	4	23	27
4	9	55	16	46	7	58	5	16	8	56	4	14	26
5	9	47	16	34	7	53	5	5	8	34	4	5	25
6	9	40	16	23	7	48	4	53	8	17	3	56	24
7	9	33	16	11	7	42	4	42	7	58	3	47	23
8	9	26	15	58	7	35	4	30	7	38	3	38	22
9	9	19	15	45	7	29	4	18	7	18	3	29	21
10	9	11	15	32	7	23	4	6	6	58	3	19	20
11	9	2	15	18	7	16	3	54	6	38	3	9	19
12	8	54	15	4	7	9	3	43	6	18	2	59	18
13	8	46	14	50	7	3	3	31	5	58	2	50	17
14	8	37	14	36	6	56	3	19	5	38	2	40	16
15	8	28	14	21	6	49	3	7	5	17	2	30	15
16	8	20	14	6	6	42	2	54	4	56	2	20	14
17	8	11	13	51	6	35	2	42	4	35	2	10	13
18	8	1	13	35	6	27	2	30	4	14	2	0	12
19	7	52	13	20	6	20	2	18	3	54	1	50	11
20	7	43	13	4	6	12	2	5	3	33	1	40	10
21	7	34	12	48	6	4	1	52	3	12	1	30	9
22	7	24	12	31	5	56	1	40	2	51	1	20	8
23	7	14	12	15	5	49	1	28	2	30	1	10	7
24	7	3	11	58	5	41	1	15	2	8	1	0	6
25	6	53	11	41	5	33	1	2	1	46	0	50	5
26	6	43	11	23	5	24	0	49	1	25	0	40	4
27	6	33	11	5	5	16	0	37	1	4	0	30	3
28	6	22	10	47	5	8	0	25	0	43	0	20	2
29	6	11	10	29	4	59	0	12	0	21	0	10	1
30	6	0	10	11	4	50	0	0	0	0	0	0	0
	sub.		add		sub.		sub		add.		sub.		
	Sign 7.						Sign 6.						

A Table *of the Second Equation of the* Moon.

Ann. Arg.	Annual Argument. Sign 0 6 sub. ′	″	1 7 sub. ′	″	2 8 sub. ′	″	Ann. Arg.
0	0	0	3	15	3	15	30
1	0	8	3	19	3	11	29
2	0	16	3	22	3	6	28
3	0	23	3	25	3	2	27
4	0	31	3	28	2	57	26
5	0	39	3	31	2	52	25
6	0	47	3	34	2	47	24
7	0	54	3	36	2	41	23
8	1	2	3	38	2	36	22
9	1	9	3	40	2	30	21
10	1	17	3	42	2	24	20
11	1	24	3	43	2	18	19
12	1	31	3	44	2	12	18
13	1	38	3	44	2	5	17
14	1	46	8	45	1	59	16
15	1	52	3	45	1	52	15
16	1	59	3	45	1	46	14
17	2	5	3	44	1	28	13
18	2	12	3	44	1	31	12
19	2	18	3	43	1	24	11
20	2	24	3	42	1	17	10
21	2	30	3	40	1	9	9
22	2	36	3	38	1	2	8
23	2	41	3	36	0	54	7
14	2	47	3	34	0	47	6
25	2	52	3	31	0	39	5
26	2	57	3	28	0	31	4
27	3	2	3	25	0	24	3
28	3	6	3	22	0	16	2
29	3	11	3	19	0	8	1
30	3	15	3	15	0	0	0
	Si. 11. 5 add		Si. 10. 4 add		9 3 add		

A Table of the third Equation of the Moon.

Ann. Arg.	Dist of Sun from Node. Sign 0 6 sub. '	''	1 7 Sub. '	''	2 8 Sub. '	''	Ann. Arg.
0	0	0	0	41	0	41	30
1	0	1	0	41	0	40	29
2	0	3	0	42	0	39	28
3	0	5	0	43	0	38	27
4	0	6	0	43	0	37	26
5	0	8	0	44	0	36	25
6	0	10	0	45	0	25	24
7	0	11	0	45	0	34	23
8	0	13	0	45	0	32	22
9	0	14	0	46	0	31	21
10	0	16	0	46	0	30	20
11	0	17	0	46	0	29	19
12	0	19	0	47	0	27	18
13	0	20	0	47	0	26	17
14	0	22	0	47	0	25	16
15	0	23	0	47	0	23	15
16	0	25	0	47	0	22	14
17	0	26	0	47	0	20	13
18	0	27	0	47	0	19	12
19	0	29	0	46	0	17	11
20	0	30	0	46	0	16	10
21	0	31	0	49	0	14	9
22	0	32	0	45	0	13	8
23	0	34	0	45	0	11	7
24	0	35	0	44	0	10	6
25	0	36	0	44	0	8	5
26	0	37	0	43	0	6	4
25	0	38	0	43	0	5	3
28	0	39	0	42	0	3	2
29	0	40	0	41	0	1	1
30	0	41	0	41	0	0	0
	11 5 Add.		10 4 Add.		9 3 Add.		

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A Table *of the Fourth Equation of the* Moon.

Ann. Arg.	Argument 4th Equation						Ann. Arg.
	Si. { 0 + / 6 − }		Si. { 1 + / 7 − }		Si { 2 + / 8 − }		
	′	″	′	″	′	″	
0	0	0	1	12	2	5	30
1	0	2	1	15	2	7	29
2	0	5	1	17	2	8	28
3	0	7	1	19	2	9	27
4	0	10	1	21	2	10	26
5	0	12	1	23	2	11	25
6	0	15	1	25	2	12	24
7	0	17	1	27	2	13	23
8	0	20	1	29	2	14	22
9	0	22	1	31	2	15	21
10	0	25	1	33	2	16	20
11	0	27	1	35	2	17	19
12	0	30	1	37	2	17	18
13	0	32	1	39	2	18	17
14	0	35	1	41	2	19	16
15	0	37	1	43	2	20	15
16	0	40	1	44	2	20	14
17	0	42	1	46	2	21	13
18	0	44	1	48	2	21	12
19	0	46	1	49	2	22	11
20	0	49	1	51	2	22	10
21	0	51	1	52	2	23	9
22	0	54	1	54	2	23	8
23	0	56	1	55	2	24	7
24	0	59	1	57	2	24	6
25	1	1	1	58	2	24	5
26	1	3	2	0	2	24	4
27	1	5	2	1	2	25	3
28	1	8	2	3	2	25	2
29	1	10	2	4	2	25	1
30	1	12	2	5	2	25	0
	11 sub.		10 sub.		9 sub.		
	5 Add		4 add.		3 add.		

A Table *of the Second Equation of the* Moon's Apogeon, *with the Logarithm of the Eccentricity of her Orb.*

An. Arg.	Signs 0 Equation add. °	′	″	6. Logarith.	Ann. Arg.
0	0	00	00	8.824629	30
1	0	21	04	8.824590	29
2	0	42	08	8.824475	28
3	1	03	10	8.824284	27
4	1	24	09	8.824016	26
5	1	45	05	8.823671	25
6	2	05	57	8.823252	24
7	2	26	44	8.822753	23
8	2	47	25	8.822179	22
9	3	08	00	8.821529	21
10	3	28	27	8.820803	20
11	3	48	46	8.820001	19
12	4	08	55	8.819124	18
13	4	28	54	8.818170	17
14	4	48	42	8.817142	16
15	5	08	19	8.816038	15
16	5	27	43	8.814858	14
17	5	46	53	8.813604	13
18	6	05	48	8.812275	12
19	6	24	27	8.810873	11
20	6	42	50	8.809397	10
21	7	00	56	8.807847	9
22	7	18	44	8.806223	8
23	7	36	12	8.804528	7
24	7	53	20	8.802760	6
25	8	10	06	8.800920	5
26	8	26	29	8.799009	4
27	8	42	29	8.797028	3
28	8	58	05	8.794978	2
29	9	13	1e	8.792857	1
30	9	27	57	8.790668	0
	Signs 11			5 sub.	

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The Table *of the Second Equation of the Moon's Apogeon, with the Logarithm of the Eccentricity of her Orb, continued.*

An. Arg.	Signs 1 Equation add. °	′	″	7 Logar.	An. Arg.
0	9	27	57	8.790668	30
1	9	42	12	8.788412	29
2	9	55	58	8.786089	28
3	10	09	14	8.783371	27
4	10	21	58	8.781248	26
5	10	34	09	8.778732	25
6	10	45	47	8.776153	24
7	10	56	49	8.773513	23
8	11	07	15	8.770814	22
9	11	17	04	8.768057	21
10	11	26	14	8.765243	20
11	11	34	43	8.762375	19
12	11	42	31	8.759454	18
13	11	49	36	8.756482	17
14	11	55	57	8.753461	16
15	12	01	33	8.750395	15
16	12	06	22	8.747248	14
17	12	10	23	8.744131	13
18	12	13	35	8.740941	12
19	12	15	56	8.737714	11
20	12	17	24	8.734455	10
21	12	17	59	8.731167	9
22	12	17	40	8.727853	8
23	12	16	25	8.724518	7
24	12	14	13	8.721164	6
25	12	11	02	8.717796	5
26	12	06	52	8.714419	4
27	12	01	42	8.711037	3
28	11	55	51	8.707654	2
29	11	48	17	8.704277	1
30	11	40	00	8.700910	0
	Sign 10			4 sub.	

A Table *of the Second Equation of the* Moon's Apogeon, *with the Logarithm of the Eccentricity of her Orb.*

An. Arg.	Signs 2			8.	Ann. Arg.
	Equation add.			Logarirh.	
	°	'	"		
0	11	40	00	8.700910	30
1	11	30	39	8.697559	29
2	11	20	14	8.694229	28
3	11	8	44	8.690927	27
4	10	56	8	8.687658	26
5	10	42	26	8.684430	25
6	10	27	38	8.681247	24
7	10	11	45	8.678118	23
8	9	54	47	8.675051	22
9	9	36	44	8.672049	21
10	9	17	37	8.669121	20
11	8	57	25	8.666277	19
12	8	36	11	8.663520	18
13	8	13	56	8.660861	17
14	7	50	42	8.658305	16
15	7	26	29	8.655859	15
16	7	1	21	8.653532	14
17	6	35	19	8.651331	13
18	6	08	26	8.649261	12
19	5	40	45	8.647329	11
20	5	12	18	8.645542	10
21	4	43	10	8.643906	9
22	4	13	23	8.642426	8
23	3	43	01	8.641108	7
24	3	12	09	8.639954	6
25	2	40	49	8.638973	5
26	2	09	07	8.638164	4
27	1	37	06	8.637532	3
28	1	04	52	8.637079	2
29	0	32	28	8.636806	1
30	0	00	00	8.636715	0
	Signs	9		3 sub.	

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A Table *of the Moon's Variation.*

☽ à ☉	0 Sign 6 add. ′	″	1 Sign 7 add. ′	″	2 Sign 8 add. ′	″	☽ à ☉
0	0	00	30	27	30	27	30
1	1	14	31	03	29	49	29
2	2	27	31	36	29	09	28
3	3	40	32	07	28	27	27
4	4	54	32	36	27	43	26
5	6	06	33	03	26	56	25
6	7	19	33	27	26	08	24
7	8	30	33	48	25	18	23
8	9	41	34	07	24	26	22
9	10	52	34	24	23	32	21
10	12	02	34	38	22	36	20
11	13	10	34	50	21	39	19
12	14	18	34	59	20	40	18
13	15	25	35	05	19	40	17
14	16	30	35	09	18	38	16
15	17	35	35	10	17	35	15
16	18	38	35	09	16	30	14
17	19	40	35	05	15	25	13
18	20	40	34	54	14	18	12
19	21	39	34	50	13	10	11
20	22	36	34	38	12	02	10
21	23	32	34	24	10	32	9
22	24	26	34	07	9	41	8
23	25	18	33	48	8	30	7
24	26	08	33	27	7	19	6
25	26	56	33	03	6	06	5
26	27	43	32	26	4	54	4
27	28	27	32	07	3	40	3
28	29	09	31	36	2	27	2
29	29	49	31	03	1	14	1
30	30	27	30	27	0	00	0
	11 sub.	5	10 sub.	4	9 sub.	3	

A Table *of the Seventh Equation of the Moon.*

☽ à ☉	Sub. 0 Add. 6 ′	″	Sub. 1 Add 7 ′	″	Sub. 2 Add 8 ′	″	☽ à ☉
0	0	00	1	10	2	01	30
1	0	03	1	12	2	04	29
2	0	05	1	14	2	05	28
3	0	07	1	16	2	06	27
4	0	10	1	18	2	07	26
5	0	12	1	20	2	08	25
6	0	15	1	22	2	09	24
7	0	17	1	24	2	10	23
8	0	19	1	26	2	11	22
9	0	22	1	28	2	12	21
10	0	24	1	30	2	12	20
11	0	27	1	32	2	13	19
12	0	29	1	34	2	14	18
13	0	32	1	36	2	14	17
14	0	34	1	38	2	15	16
15	0	36	1	39	2	15	15
16	0	39	1	41	2	16	14
17	0	41	1	43	2	16	13
18	0	44	1	44	2	17	12
19	0	46	1	46	2	17	11
20	0	48	1	47	2	18	10
21	0	51	1	49	2	18	9
22	0	53	1	50	2	19	8
23		55	1	52	2	19	7
24	0	57	1	53	2	19	6
25	0	59	1	55	2	20	5
26	1	02	1	56	2	20	4
27	1	04	1	57	2	20	3
28	1	06	1	59	2	20	2
29	1	08	2	00	2	20	1
30	1	10	2	01	2	20	0
	Sub. 5 Add 11		Sub. 4 Add 10		Sub. 3 Add 9		

A Table of the Second Equation of the Moon's Node, with the Logarithm-Sine of the Inclination of her Orbit.

Mean Distance of the Sun from the Node

☉ à ☊	Signs 0			6	☉ à ☊
	Equation add			Logar. Sine	
	°	′	″	° ′ ″	
0	0	00	00	8.964625	30
1	0	03	13	8.96461	29
2	0	06	26	8.96459	28
3	0	09	38	8.96456	27
4	0	12	49	8.96451	26
5	0	16	00	8.96444	25
6	0	19	09	8.96436	24
7	0	22	16	8.96426	23
8	0	25	22	8.96415	22
9	0	28	26	8.96403	21
10	0	31	28	8,96390	20
11	0	34	27	8.96375	19
12	0	37	24	8.96358	18
13	0	40	17	8.96340	17
14	0	43	07	8 96321	16
15	0	45	54	8.96300	15
16	0	48	38	8.96278	14
17	0	51	17	8.96255	13
18	0	53	53	8 96231	12
19	0	56	24	8.96205	11
20	0	58	51	8.96178	10
21	1	01	14	8.96150	9
22	1	03	32	8.96121	8
23	1	05	44	8.96091	7
24	1	07	52	8.96060	6
25	1	09	55	8.96028	5
26	1	11	53	8.95995	4
27	1	13	43	8.95060	3
28	1	15	29	8.95925	2
29	1	17	13	8.95889	1
30	1	18	44	8.95853	0
	Signs 11,			5 sub.	

A Table *of the Second Equation of the Moon's Node, with the Logarithm-Sine of the Inclination of her Orbit.*

Mean Diſtance of the Sun from the Node

☉ à ☊	Signs 1			7	☉ à ☊
	Equation add			Logar. Sine	
	°	'	"	° ' "	
0	1	18	44	8.95853	30
1	1	20	12	8.95816	29
2	1	21	35	8.95777	28
3	1	22	51	8.95737	27
4	1	24	01	8.95698	26
5	1	25	04	8.95658	25
6	1	26	01	8.95617	24
7	1	26	52	8.95576	23
8	1	27	37	8.95534	22
9	1	28	14	8.95492	21
10	1	28	46	8,95450	20
11	1	29	10	8.95407	19
12	1	29	28	8.95363	18
13	1	29	40	8.95320	17
14	1	29	45	8 95277	16
15	1	29	43	8.95234	15
16	1	29	35	8.95190	14
17	1	29	21	8.95147	13
18	1	28	59	8 95104	12
19	1	28	32	8.95060	11
20	1	27	58	8.95017	10
21	1	27	17	8.94974	9
22	1	26	31	8.94931	8
23	1	25	38	8.94889	7
24	1	24	39	8 94847	6
25	1	23	34	8.94806	5
26	1	22	23	8.94764	4
27	1	21	06	8.94724	3
28	1	19	44	8.94684	2
29	1	18	16	8.94645	1
30	1	16	42	8.94605	0
	Signs 10			4 ſub.	

A Table *of the Second Equation of the Moon's Node, with the Logarithm-Sine of the Inclination of her Orbit.*

Mean Diſtance of the Sun from the Node.

☉ a ☊	Signs	2		8	☉ a ☊
	Equation add.			Logar. Sine.	
	°	′	″	° ′ ″	
0	1	16	42	8.94605	30
1	1	15	02	8.94567	29
2	1	13	19	8.94531	28
3	1	11	30	8 94495	27
4	1	9	35	8.94459	26
5	1	7	36	8.94425	25
6	1	5	32	8.94391	24
7	1	3	24	8.94359	23
8	1	1	11	8.94328	22
9	0	58	54	8.94298	21
10	0	56	33	8.94269	20
11	0	54	08	8.24241	19
12	0	51	39	8.94214	18
13	0	49	07	8.94188	17
14	0	46	31	8.94164	16
15	0	43	53	8.94141	15
16	0	41	11	8.94119	14
17	0	38	26	8.94099	13
18	0	35	59	8.94080	12
19	0	32	49	8.94062	11
20	0	29	57	8.94046	10
21	0	27	04	8.94032	9
22	0	24	08	8.94019	8
23	0	21	10	8.94008	7
24	0	18	12	8.93997	6
25	0	15	12	8.93988	5
26	0	12	10	8.93981	4
27	0	9	09	8.93976	3
28	0	6	06	8.93972	2
29	0	2	03	8.93970	1
30	0	0	00	8.93970	0
	Sign 9			3 ſub.	

A Table *of the Latitude of the Moon,* &c. *in the* Syzygia's.

Middle Distance of Sun from the Moon's Node.

Arg. Lat.	Sign 0 N. Sign 6 S. Latitude. °	'	"	*Inclinat. of the Way of the ☽ in Eclipses.* °	'	"	*Reduc. Sub.* '	"	Arg. Lat.
0	0	00	00	5	17	20	0	0	30
1	0	05	14	5	17	17	0	14	29
2	0	10	28	5	17	08	0	29	28
3	0	15	42	5	16	54	0	43	27
4	0	20	56	5	16	33	0	58	26
5	0	26	09	5	16	07	1	12	25
6	0	31	21	5	15	35	1	26	24
7	0	36	33	5	14	56	1	41	23
8	0	41	45	5	14	13	1	55	22
9	0	46	52	5	13	23	2	9	21
10	0	52	05	5	12	28	2	22	20
11	0	57	14	5	11	27	2	36	19
12	1	02	22	5	10	20	2	49	18
13	1	07	28	5	09	07	3	2	17
14	1	12	34	5	07	49	3	15	16
15	1	17	38	5	06	25	3	28	15
16	1	22	41	5	04	55	3	40	14
17	1	27	42	5	03	20	3	53	13
18	1	32	42	5	01	39	4	4	12
19	1	37	40	4	59	53	4	16	11
20	1	42	36	4	58	00	4	27	10
21	1	47	31	4	56	03	4	38	9
22	1	52	24	4	54	00	4	49	8
23	1	57	15	4	51	51	4	59	7
24	2	02	03	4	49	37	5	9	6
25	2	06	48	4	47	18	5	19	5
26	2	11	33	4	44	54	5	28	4
27	2	16	14	4	42	24	5	37	3
28	2	20	52	4	39	49	5	45	2
29	2	35	29	4	37	09	5	53	1
30	2	30	03	4	34	24	6	0	0
	Sign 11 South } Sign 5 North }			Descend.			Add		

A Table *of the Latitude of the Moon,* &c. *in the* Syzygias.

Middle Diſtance of the Sun from the Moon's Node.

Arg. Lat.	Sign 1 North, Sign 7 South, Latitude. °	′	″	Reduc. Sub. ′	″	Arg. Lat.
0	2	30	03	6	00	30
1	2	34	33	6	07	29
2	2	39	01	6	14	28
3	2	43	26	6	20	27
4	2	47	39	6	26	26
5	2	52	08	6	31	25
6	2	56	24	6	36	24
7	3	00	37	6	40	23
8	3	04	46	6	44	22
9	3	08	52	6	47	21
10	3	12	54	6	50	20
11	3	16	53	6	52	19
12	3	20	48	6	54	18
13	3	24	40	6	55	17
14	3	28	28	6	56	16
15	3	32	12	6	56	15
16	3	35	52	6	56	14
17	3	39	28	6	55	13
18	3	43	0	6	54	12
19	3	46	27	6	52	11
20	3	49	52	6	50	10
21	3	53	11	6	47	9
22	3	56	25	6	44	8
23	3	59	37	6	40	7
24	4	02	42	6	36	6
25	4	05	45	6	31	5
26	4	08	42	6	26	4
27	4	11	34	6	20	3
28	4	14	22	6	14	2
29	4	17	07	6	07	1
30	4	19	44	6	00	0
	Sign 10 South, Sign 4 North			Deſcend. add		

A Table *of the Latitude of the Moon*, &c. *in the* Syzygia's.

Middle Distance of Sun from the Moon's Node.

Arg. Lat.	Sign 2 N. Sign 8 S. Latitude. °	′	″	Reduc. sub. ′	″	Arg. Lat.
0	4	19	44	6	00	30
1	4	22	17	5	53	29
2	4	24	47	5	45	28
3	4	27	11	5	37	27
4	4	29	30	5	28	26
5	4	31	45	5	19	25
6	4	33	54	5	09	24
7	4	35	59	4	59	23
8	4	37	57	4	49	22
9	4	39	52	4	38	21
10	4	41	41	4	27	20
11	4	43	25	4	16	19
12	4	45	04	4	04	18
13	4	46	38	3	53	17
14	4	48	09	3	40	16
15	4	49	29	3	28	15
16	4	50	47	3	15	14
17	4	52	00	3	02	13
18	4	53	07	2	49	12
19	4	54	08	2	36	11
20	4	55	05	2	22	10
21	4	55	56	2	09	9
22	4	56	42	1	55	8
23	4	57	22	1	41	7
24	4	57	58	1	26	6
25	4	58	27	1	12	5
26	4	58	51	0	58	4
27	4	59	10	0	43	3
28	4	59	24	0	29	2
29	4	59	32	0	14	1
30	4	59	35	0	00	0
	Sign 10 South Sign 4 North			Desc. add.		

A Table *of the Hourly Motions, Semidiameters, and Horizontal Parallaxes of the Sun and Moon in Eclipses.*

Mean Anom. ☉ *and* ☽. S.	°	*Pr. Hourly Motion of the* ☉ ′	″	*Semidimeter of the Suu.* ′	″	*Mean Anom.* ☉ *and* ☽. °	S.
0	0	2	23	15	49	0	12
	5	2	23	15	49	25	
	10	2	23	15	49	20	
	15	2	23	15	49	15	
	20	2	23	15	50	10	
	25	2	23	15	50	5	
1	0	2	24	15	51	0	11
	5	2	24	15	51	25	
	10	2	24	15	52	20	
	15	2	24	15	53	15	
	20	2	25	15	54	10	
	25	2	25	15	55	5	
2	0	2	25	15	56	0	10
	5	2	26	15	57	25	
	10	2	26	15	59	20	
	15	2	26	16	01	15	
	20	2	27	16	02	10	
	25	2	27	16	03	5	
3	0	2	28	16	05	0	9
	5	2	28	16	06	25	
	10	2	28	16	07	20	
	15	2	29	16	09	15	
	20	2	29	16	10	10	
	25	2	30	16	11	5	
4	0	2	30	16	13	0	8
	5	2	11	16	14	25	
	10	2	31	16	15	20	
	15	2	31	16	16	15	
	20	2	32	16	17	10	
	25	2	32	16	18	5	
5	0	2	32	16	19	0	7
	5	2	32	16	20	25	
	10	2	33	16	20	20	
	15	2	33	16	21	15	
	20	2	33	16	21	10	
	25	2	33	16	22	5	
6	0	2	33	16	22	0	6

A Table *of the Hourly Motions, Semidiameters, and Horizontal Parallaxes of the Sun and Moon in Eclipses.*

Mean Anom. ☉ *and* ☽. S.	°	*Tr. Hourly Motion of the* ☽. '	"	*Semidiameter of the Moon* '	"	*Horiz. Paralax of* ☽. °	"	*Mean Anom.* ☉ *and* ☽. °	S.
0	0	29	33	14	42	53	28	0	12
	5	29	34	14	42	53	29	25	
	10	29	36	14	43	53	31	20	
	15	29	39	14	44	53	35	15	
	20	29	45	14	45	53	41	10	
	25	29	53	14	47	73	48	5	
1	0	30	01	14	50	53	57	0	11
	5	30	11	14	53	54	07	25	
	10	30	22	14	55	54	18	20	
	15	30	36	14	59	54	32	15	
	20	30	50	15	02	54	45	10	
	25	31	06	15	07	55	06	5	
2	0	31	23	15	11	55	16	0	10
	5	21	42	15	16	55	33	25	
	10	32	01	15	21	55	51	20	
	15	32	23	15	26	56	10	15	
	20	32	45	15	31	56	30	10	
	25	33	08	15	37	56	49	5	
3	0	33	32	15	42	57	09	0	9
	5	33	56	15	48	57	29	25	
	10	34	21	15	53	58	49	20	
	15	34	45	15	59	58	09	15	
	20	35	08	16	04	58	28	10	
	25	35	31	16	10	59	47	5	
4	0	35	54	16	15	59	05	0	8
	5	36	14	16	19	59	23	25	
	10	36	34	16	24	59	40	20	
	15	36	53	16	28	59	55	15	
	20	37	10	16	32	60	10	10	
	25	37	24	16	36	60	23	5	
5	0	37	39	16	39	60	34	0	7
	5	37	50	16	42	60	44	25	
	10	38	00	16	44	60	52	20	
	15	38	06	16	45	60	58	15	
	20	38	14	16	47	61	03	10	
	25	38	17	16	48	61	06	5	
6	0	38	18	16	48	61	07	0	6

A Table *of the Moon's Ecliptic Equation and Logarithm of her Distance from the Earth, to supply the Place of that in my* System, Pages 51, 52, 53.

Anom.	Sign 0 sub. Equation. °	′	″	Logar.	Anom.
0	0	00	00	5.029668	30
1	0	05	00	5.029664	29
2	0	09	58	5.029653	28
3	0	14	56	5 029633	27
4	0	19	54	5.029606	26
5	0	24	54	5.029571	25
6	0	29	52	5.029528	24
7	0	34	48	5.029477	23
8	0	39	46	5.029419	22
9	0	44	44	5.029353	21
10	0	49	36	5.029274	20
11	0	54	32	5.029197	19
12	0	59	22	5.029108	18
13	1	04	14	5.029012	17
14	1	09	10	5.028907	16
15	1	14	00	5.028794	15
16	1	18	48	5.028674	14
17	1	23	38	5.028547	13
18	1	28	24	5.028411	12
19	1	33	10	5.028268	11
20	1	37	54	5.028118	10
21	1	42	32	5.027960	9
22	1	47	16	5.027794	8
23	1	51	54	5.027621	7
24	1	56	32	5.027440	6
25	2	01	08	5.027252	5
26	2	05	40	5.027057	4
27	2	10	12	5.026854	3
28	2	14	40	5.026643	2
29	2	19	08	5.026425	1
30	2	23	32	5 026200	0
	Sign 11 add				

The

The Table *of the Moon's Ecliptic Equation and Logarithm continued.*

Anom.	Sign 1 sub. Equation. °	′	″	Logar.	Anom.
0	2	23	32	5.026200	30
1	2	27	54	5.025968	29
2	2	32	14	5.025728	28
3	2	36	32	5.035482	27
4	2	40	44	5.025228	26
5	2	45	00	5.024967	25
6	2	49	08	5.024699	24
7	2	53	14	5.024424	23
8	2	57	16	5.024142	22
9	3	1	18	5.023853	21
10	3	5	18	5.023557	20
11	3	9	10	5.023254	19
12	3	13	02	5.022944	18
13	3	16	52	5.022628	17
14	3	20	36	5.022304	16
15	3	24	18	5.021974	15
16	3	27	56	5.021638	14
17	3	31	32	5.021294	13
18	3	35	02	5.020945	12
19	3	38	32	5.020590	11
20	3	41	54	5.020228	10
21	3	45	16	5.019860	9
22	3	48	31	5.019485	8
23	3	51	46	5.019105	7
24	3	54	54	5.018718	6
25	4	58	00	5.018326	5
26	3	1	00	5.017928	4
27	4	3	58	5.017523	3
28	4	6	50	5.017113	2
29	4	9	38	5.016698	1
30	4	12	20	5.016277	0
	Sign 10			add	

The

A Table *of the Moon's Elliptic Equation and Logarithm of her Distance from the Earth, continued.*

Anom.	Sign 2 sub.				Anom.
	Equation.				
	°	′	″	Logar.	
0	4	12	20	5.016277	30
1	4	15	04	5.015851	29
2	4	17	36	5.015419	28
3	4	20	10	5.014982	27
4	4	22	36	5.014540	26
5	4	24	58	5.014093	25
6	4	27	14	5.013640	24
7	4	29	30	5.013183	23
8	4	31	36	5.012722	22
9	4	33	42	5.012255	21
10	4	35	38	5.011784	20
11	4	37	34	5.011309	19
12	4	39	22	5.010838	18
13	4	41	08	5.010346	17
14	4	42	46	5.009858	16
15	4	44	20	5.009367	15
16	4	45	50	5.008871	14
17	4	47	16	5.008371	13
18	4	48	34	5.007869	12
19	4	49	50	5.007363	11
20	4	50	58	5.006853	10
21	4	52	04	5.006341	9
22	4	53	00	5.005826	8
23	4	53	56	5.005307	7
24	4	54	42	5.004786	6
25	4	55	26	5.004262	5
26	4	56	02	5.003736	4
27	4	56	36	5.093207	3
28	4	57	02	5.002677	2
29	4	57	34	5.002144	1
30	4	57	40	5.001610	0
	Sign 9 add.				

I The

The Table *of the Moon's Elliptic Equation, with the Logarithm of her Distance from the Earth, continued.*

Anom.	Signs 3 sub. Equation. °	′	″	Logarith.	Anom.
0	4	57	40	5.001610	30
1	4	57	52	5.001074	29
2	4	57	54	5.000537	28
3	4	57	56	4.999998	27
4	4	57	50	4.999458	26
5	4	57	42	4.998917	25
6	4	57	24	4.998375	24
7	4	57	02	4.997832	23
8	4	56	34	4.997290	22
9	4	56	02	4.996747	21
10	4	55	22	4.996203	20
11	4	54	40	4.995659	19
12	4	53	48	4.995117	18
13	4	52	54	4.993575	17
14	4	51	52	4.994033	16
15	4	50	48	4.993492	15
16	4	49	36	4.992952	14
17	4	48	20	4.992412	13
18	4	46	56	4.991874	12
19	4	45	30	4.991337	11
20	4	43	56	4.990803	10
21	4	42	18	4.990270	9
22	4	40	34	4.989739	8
23	4	38	46	4.989211	7
24	4	36	48	4.988685	6
25	4	34	56	4.988162	5
26	4	32	44	4.987641	4
27	4	30	36	4.987124	3
28	4	28	18	4.986610	2
29	4	25	58	4.986099	1
30	4	23	30	4.985591	0
	Signs 8			add.	

T Table *of the Moon's Elliptic Equation, with the Logarithm of her Distance from the Earth, continued.*

Anom.	Sign 4 Equation. °	′	″	sub. Logar.	Anom.
0	4	23	30	4.955591	30
1	4	21	02	4.985088	29
2	4	18	24	4.984588	28
3	4	15	44	4.984093	27
4	4	12	56	4.983602	26
5	4	10	08	4.983116	25
6	4	07	10	4.982634	24
7	4	04	10	4.982158	23
8	4	01	02	4.981686	22
9	3	57	54	4.981220	21
10	3	54	36	4.980759	20
11	3	51	18	4.980304	19
12	3	47	52	4.979856	18
13	3	44	24	4.979412	17
14	3	40	50	4.978975	16
15	3	37	14	4.978545	15
16	3	33	28	4.978120	14
17	3	29	44	4.977703	13
18	3	25	52	4.977293	12
19	3	21	58	4.976890	11
20	3	17	58	4.976494	10
21	3	13	56	4.976106	9
22	3	09	48	4.975724	8
23	3	05	38	4.975351	7
24	3	01	24	4.974929	6
25	2	57	06	4.974629	5
26	2	52	44	4.974280	4
25	2	48	18	4.973939	3
28	2	43	50	4.973607	2
29	2	39	17	4.973284	1
30	2	34	42	4.972970	0
	Sign 7			add.	

The Table *of the Moon's Elliptic Equation, with the Logarithm of her Distance from the Earth, continued.*

Anom.	Sign 5 sub.				Anom.
	Equation.			Logar.	
0	2	34	42	4.972970	30
1	2	30	06	4.972665	29
2	2	25	22	4.972368	28
3	2	20	38	4 972081	27
4	2	15	50	4.971802	26
5	2	11	02	4.971534	25
6	2	06	08	4.971274	24
7	2	01	14	4 971025	23
8	1	56	14	4.970785	22
9	1	51	14	4.970555	21
10	1	46	12	4.970335	20
11	1	41	08	4.970126	19
12	1	36	00	4.969927	18
13	1	30	52	4.969738	17
14	1	25	40	4.969559	16
15	1	20	28	4.969391	15
16	1	15	14	4.969232	14
17	1	09	58	4.969085	13
18	1	04	40	4.969944	12
19	0	59	22	4.968822	11
20	0	54	02	4.968706	10
21	0	48	42	4.968602	9
22	0	43	20	4.968509	8
23	0	37	56	4.968427	7
24	0	32	32	4.968355	6
25	0	27	08	4.968294	5
26	0	21	44	4.968244	4
27	0	16	18	4.968206	3
28	0	10	52	4.968179	2
29	0	05	26	4.968162	1
30	0	00	00	4.968156	0
	Sign 6 add.				

A Table *of the Curtation of* ♀, ♂, ♃, ♄, *to be used with my* System.

Arg. Lat.	Curtation of *Venus.* Signs 0 / 6	Signs 1 / 7	Signs 2 / 8	Arg. Lat.
0	0	190	570	30
1	0	201	581	29
2	1	213	592	28
3	2	225	601	27
4	4	237	614	26
5	6	250	624	25
6	8	262	634	24
7	11	275	644	23
8	15	288	653	22
9	19	301	662	21
10	23	314	671	20
11	28	327	679	19
12	33	340	687	18
13	38	353	695	17
14	44	366	702	16
15	51	380	709	15
16	58	393	716	14
17	65	406	721	13
18	72	420	727	12
19	80	433	732	11
20	89	446	737	10
21	97	459	741	9
22	106	472	745	8
23	116	485	749	7
24	125	497	752	6
25	135	510	754	5
26	146	522	756	4
27	156	534	758	3
28	167	548	759	2
29	178	558	760	1
30	190	570	760	0
	Signs 11 5	10 4	9 3	

The Table *of the Curtation of* ♀, ♂, ♃, *and* ♄, *to be used with my* System.

Arg. Lat.	Curtation of *Mars*. Signs 0 6	Signs 1 7	Signs 2 8	Arg. Lat.
0	0	56	170	30
1	0	60	173	29
2	0	64	176	28
3	1	67	180	27
4	1	71	183	26
5	2	74	186	25
6	2	78	189	24
7	3	82	192	23
8	4	86	195	22
9	5	90	197	21
10	7	93	200	20
11	8	97	202	19
12	10	101	205	18
13	11	105	207	17
14	13	109	209	16
15	15	113	211	15
16	17	117	213	14
17	19	121	215	13
18	22	125	217	12
19	24	129	218	11
20	27	133	220	10
21	29	137	221	9
22	32	141	222	8
23	34	144	223	7
24	37	148	224	6
25	40	152	225	5
26	43	155	125	4
27	47	159	226	3
28	50	163	226	2
29	53	166	226	1
30	56	170	226	0
	Signs 11 5	10 4	9 3	

The Table *of the Curtation of* ♀, ♂, ♃, *and* ♄, *continued.*

Arg. Lat.	Curtation of *Jupiter*. Signs 0 / 6	Signs 1 / 7	Signs 2 / 8	Arg. Lat.
0	0	29	86	30
1	0	30	88	29
2	0	32	90	28
3	0	34	91	27
4	0	36	93	26
5	1	38	94	25
6	1	40	96	24
7	2	42	97	23
8	2	44	99	22
9	3	46	100	21
10	3	48	102	20
11	4	50	103	19
12	5	52	104	18
13	6	53	105	17
14	7	55	106	16
15	8	57	107	15
16	9	59	108	14
17	10	61	109	13
18	11	64	110	12
19	12	66	111	11
20	13	68	112	10
21	15	69	113	9
22	16	71	113	8
23	18	73	114	7
24	19	75	114	6
25	20	77	114	5
26	22	79	114	4
27	24	81	115	3
28	25	83	115	2
29	27	85	115	1
30	29	86	115	0
	11	10	9	
	5	4	3	

The Table *of the Curtation of* ♀, ♂, ♃, *and* ♄, *continued.*

Arg. Lat.	Curtation of *Saturn.* Signs 0 / 6	Signs 1 / 7	Signs 2 / 8	Arg. Lat.
0	0	103	307	30
1	0	110	316	29
2	1	116	322	28
3	1	123	328	27
4	2	129	334	26
5	3	136	340	25
6	5	143	345	24
7	6	150	350	23
8	8	157	355	22
9	10	164	360	21
10	12	171	365	20
11	15	178	370	19
12	18	185	374	18
13	21	192	378	17
14	24	200	382	16
15	28	207	386	15
16	32	214	389	14
17	36	221	393	13
18	40	228	396	12
19	44	236	399	11
20	48	243	401	10
21	53	250	403	9
22	58	257	406	8
23	63	264	408	7
24	68	271	410	6
25	74	277	411	5
26	79	284	412	4
27	85	291	413	3
28	91	297	414	2
29	97	303	414	1
30	103	307	414	0
	Signs 11 / 5	*Sig.* 10 / 4	*Signs* 9 / 5	

A Table *of the Inclination, Reduction and Curtation of* ☿.

Arg. Lat.	Sign 0 N. A. Sign 6 S. A. Inclination. °	′	″	Reduc. Sub. ′	″	Curt sub.	Arg. Lat.
0	0	00	00	0	00	0	30
1	0	07	18	0	27	1	29
2	0	14	36	0	53	4	28
3	0	21	54	1	20	9	27
4	0	29	11	1	47	16	26
5	0	36	37	2	13	24	25
6	0	43	43	2	39	35	24
7	0	50	59	3	05	48	23
8	0	58	13	3	31	62	22
9	1	05	26	3	57	79	21
10	1	12	38	4	42	97	20
11	1	19	49	4	47	117	19
12	1	26	58	5	12	139	18
13	1	34	06	5	36	163	17
14	1	41	12	6	00	188	16
15	1	48	17	6	23	215	15
16	1	55	19	6	46	244	14
17	2	02	19	7	09	275	13
18	2	09	17	7	31	307	12
19	2	16	13	7	52	341	11
20	2	23	06	8	13	376	10
21	2	29	57	8	33	413	9
22	2	36	45	8	53	452	8
23	2	43	30	9	12	491	7
24	2	50	12	9	30	532	6
25	2	56	51	9	48	575	5
26	3	03	27	10	05	619	4
27	3	10	00	10	21	664	3
28	3	16	29	10	36	710	2
29	3	22	55	10	51	757	1
30	3	29	17	11	05	805	0
	Sigu 11 S.D. 5 N.D.			Add.		sub.	

The

The Table *of the Inclination, Reduction and Curtation of* ☿ *continued.*

Arg. Lat.	Sign 1 N. A. Sign 7 S. A. Inclination. °	′	″	Reduc. Sub. ′	″	Curt Sub.	Arg. Lat.
0	3	29	17	11	05	805	30
1	3	35	35	11	18	855	29
2	3	41	49	11	30	905	28
3	3	47	59	11	42	956	27
4	3	54	05	11	52	1008	26
5	4	00	07	12	02	1060	25
6	4	06	04	12	11	1114	24
7	4	11	58	12	19	1168	23
8	4	17	46	12	26	1222	22
9	4	23	30	12	32	1277	21
10	4	29	09	12	37	1333	20
11	4	34	43	12	41	1388	19
12	4	40	12	12	45	1444	18
13	4	45	36	12	47	1501	17
14	4	50	55	12	48	1557	16
15	4	56	09	12	49	1614	15
16	5	01	17	12	48	1670	14
17	5	06	19	12	47	1726	13
18	5	11	16	12	45	1783	12
19	5	16	08	12	42	1839	11
20	5	20	54	12	38	1895	10
21	5	25	34	12	33	1951	9
22	5	30	07	12	27	2006	8
23	5	34	35	12	20	2060	7
24	5	38	57	12	12	2114	6
25	5	43	13	12	03	2167	5
26	5	47	22	11	54	2220	4
27	5	51	25	11	44	2272	3
28	5	55	22	11	33	2325	2
29	5	59	12	11	20	2375	1
30	6	02	56	11	07	2425	0
	Sign 10 S. D. 4 N. D.			Add.		Sub.	

The Table *of the Inclination, Reduction and Curtation of* ☿ *continued.*

Arg. Lat.	Sign 2 N. A. Sign 8 S. A. Inclination. °	′	″	Reduc. Sub. ′	″	Curt Sub.	Arg. Lat.
0	6	02	56	11	07	2425	30
1	6	06	32	10	54	2473	29
2	6	10	02	10	39	2521	28
3	6	13	26	10	24	2567	27
4	6	16	42	10	07	2613	26
5	6	19	52	9	51	2657	25
6	6	22	55	9	33	2700	24
7	6	25	51	9	15	2741	23
8	6	28	40	8	56	2781	22
9	6	31	21	8	36	2820	21
10	6	33	56	8	16	2858	20
11	6	36	23	7	55	2894	19
12	6	38	43	7	33	2928	18
13	6	40	55	7	11	2960	17
14	6	43	01	6	49	2991	16
15	6	44	58	6	26	3021	15
16	6	46	49	6	02	3048	14
17	6	48	32	5	38	3074	13
18	6	50	07	5	14	3098	12
19	6	51	35	4	49	3120	11
20	6	52	56	4	24	3141	10
21	6	54	09	3	58	3159	9
22	6	55	14	3	33	3176	8
23	6	56	11	3	07	3191	7
24	6	57	01	2	40	3203	6
25	6	57	44	2	14	3214	5
26	6	58	18	1	47	3223	4
27	6	58	45	1	21	3230	3
28	6	59	04	0	54	3235	2
29	6	59	16	0	27	3238	1
30	6	59	20	0	00	3239	0
	Sign 9 S. D. 3 N. D.			Add.		Sub.	

CHAP.

CHAP. X.

To find the true Hour of the Night by the Fixed Stars.

FOR this purpose you must be provided with a good Quadrant that will take the Stars Altitudes to Minutes (or, if possible, to 15″;) and because the Latitude of the Place of Observation must always be known, before you can find the Hour of the Night; it may be done by Sect. II. of my *Satellite-Astronomy*; which Figure I shall here make use of, in an Example of the Latitude taken by the Altitude of two known Stars, in order to find also the true Hour of the Night.

Example. Admit, *Jan.* 2, 1734, being in a certain Place, I observe the Altitude of *Capella* to be 71° 30′ short of the Meridian, and of the Head of *Andromeda* 46°. I demand the Latitude of the Place, and true Hour of the Night?

In my *System*, Page 228, I find the Longitude of *Capella* to be ♊ 18° 8′, Latitude 22° 52′ North. From whence its Declination is 45° 42′ North, and its Right Ascension 74° 15′; The Longitude of *Andromeda*'s Head, ♈ 10° 36′, and Latitude 25° 41′ North, and consequently its Declination 27° 37′ North, and Right Ascension 358° 40′.

Now, for the Latitude of the Place of Observation.

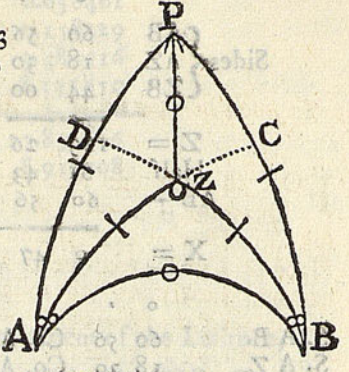
OPERATION.

	°	′	
From R A of *Capella*	74	15	+ 360°
Sub. R A of *Andromeda*	358	40	
Rem. ∠ A P B	75	35	

First,

First, In the Triangle *APB*, for the Side *AB*.

	° ′	
As *c.t.* *PB*	62 23	6.718633
To Radius	90 00	10.000000
So *SC.∠APB*	75 35	9.396150
To *t.* *DP*	25 27	9.677517
From *AP*	44 18	
Rem. *AD*	18 51	



	° ′		
As *C.S. DP*	25 27	Co. Ar.	0.044331
To *C.S. AD*	18 51		9.976060
So *C.S. BP*	62 23		9.666100
To *C.S. AB*	60 56		9.686491

Secondly, For the Angle *ABP*.

	° ′		
As S. *AB*	60 56	Co. Ar.	0.058461
To S. ∠ *APB*	75 35		9.986124
So S. *AP*	44 18		9.844114
To S. ∠ *ABP*	50 42		9.888699

Thirdly, For the Angle B A P.

	° ′		
As S. *AB*	60 56	Co. Ar.	0.058461
To S. ∠ *APB*	75 35		9.986124
So S. *PB*	62 23		9.947465
To S. ∠ *BAP*	79 4		9.992050

Fourthly,

Fourthly, For the Angle Z A B.

		°	′			°	′
Sides	AB	60	56				
	AZ	18	30				
	ZB	44	00				
	Z =	123	26			°	′
	Half	61	43	— —		61	43
	AB —	60	56		AZ —	18	30
	X =	0	47		X =	43	13

	° ′		
S. A B.	60 56	Co. Ar.	0.058461
S. A Z.	18 30	Co. Ar.	0.498524
S. X.	43 13		9.835538
S. X.	00 47		8.135810

Sum Logarithms 18.528333
Half is the Sine 10° 35′ 9.264166
Double sub. 21° 10′ = ∠ ZAB.

From the ∠ BAP 79° 4′
Rem. the ∠ ZAP 57 54

Fifthly, For the Angle ZB A.

		°	′			°	′
Sides	AB	60	56				
	ZB	44	00				
	AZ	18	30				
	Z =	123	26			°	′
	Half	61	43	—		61	43
	A B	60	56		Z B	44	00
	X =	00	47		X	17	43

S. AB

	°	′		
S. AB	60	56	Co. Ar.	0.058461
S. ZB	44	00	Co. Ar.	0.158229
S. X	17	43		9.483316
S. X	0	47		8.135810
Sum Logarithms				17.835816
½ Sine is	4	45		8.917908
Double is	9	30	= ∠ ZBA,	
From ABP	50	42		
Rem.	41	12	= ∠ PBZ.	

6. For the Side ZP, the Complement of the Latitude,

In the Oblique-angled Spheric Triangle PZB, there are known ZB, the Complement of the Altitude of the Head of *Andromeda* 44°, PB the Complement of the same Star's Declination 62° 23′, and the Angle ZPB 41° 12′ (found in the last Operation) to find the Side ZP, the Complement of the Latitude of the Place.

See the Work.

	° ′		
As *C.t.* ZB —	44 00		10.015162
To Radius	90 00		10.000000
So *S.C.* ∠ ZBP	41 12		9.876457
To *t.* BC sub.	36 00		9.861295
From BP	62 23		
Remains CP	26 23		
As *C.S.* BC	36 00	Co. Ar.	0.092042
To *C S.* CP	26 23		9.952231
So *C.S.* ZB	44 00		9.856934
To *C S.* ZP	37 12		9.901207
From	90 00		
Rem. Latitude	52 48	North.	

The

The Angles at the Zenith are,

		°	′	
Angle	AZB	152	59	
	PZB	105	08	
	PZA	101	53	
	Z	360	00	Proof.

Secondly, For the true Hour of the Night.

The Right Aſcenſion of the Sun is increaſed daily about 4 Minutes in Time; ſo that if your Meridian differ from that of *London* 6 Hours in Time, then the Right Aſcenſion will differ one Minute. If the Difference of the Meridians be 12 Hours, the Sun's Right Aſcenſion will differ 2 Minutes; if the Meridian differ 18 Hours from *London*, the Sun's Right Aſcenſion will differ 3 Minutes; and ſo one Revolution round the Globe is equal to the Sun's Diurnal Motion near one Degree, which is equal to 4 Minutes in Time, performed in near 24 Hours.

If your Place lie to the Eaſt of *London*, the Sun's Right Aſcenſion, proportioned as above, muſt be ſubtracted from the Sun's Right Aſcenſion at *London* at the ſame Hour: But if you are to the Weſt of *London*, the Minutes of the Sun's Right Aſcenſion muſt be added to the Sun's Right Aſcenſion at *London* at the ſame Hour.

As for inſtance; ſuppoſe *January* 2, at Noon, under the Meridian of *London* the Sun's Right Aſcenſion be 19 Hours 41 Minutes; what is the Sun's Right Aſcenſion at Fort St. *George* in the *Eaſt Indies*, and *Port Royal* in *Jamaica* at Noon?

Hence, becauſe the firſt Place lies 5 Hours, 24 Minutes to the Eaſt, and the latter lies 5 Hours, 4 Minutes to the Weſt of *London*, therefore I ſubtract for the firſt Place 1 Minute, and for the ſecond add 1 Minute to and from the Sun's Right Aſcenſion at *London* that Day at Noon, and I have the Sun's Right Aſcenſion at thoſe Places ſeverally the ſame Day at Noon, as follows.

Jan. 2.

		h.	′
Jan. 2, at Noon *Sun*'s Right Ascension at	Fort St. *George*	19	40
	Port Royal	19	42

The like is to be observed at any other Time and Place.

2. The Right Ascension of the Fixed Stars alter but little for several Years: Therefore as you find them in my *System*, &c. so may you use them without any sensible Error, for this Age.

For as the Difference of Meridian Altitudes of any two *Stars* gives the Difference of their Declination; so the difference of the time of their Transits over the Meridian is the difference of their Right Ascensions; and by having the Latitude of the Place, and the Meridian Altitude of any *Star*, you have also its Declination given, and *vice versa.*

Here you must also note, that all the Heavenly Bodies have the same Altitude that they have at *London*, if you are in the same Parallel, altho' distant 180° East or West, at the same Hour of the Day or Night.

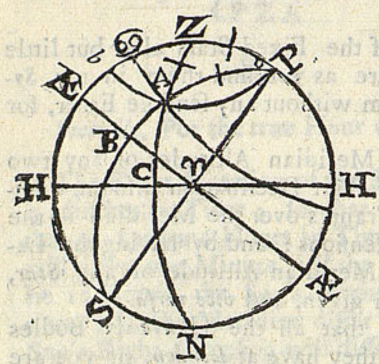
As, for instance; suppose you observe *Arcturus* to have 30° of Altitude at 9 a-Clock at Night at *London*: I say, he has the same Altitude at 9 at Night in the Latitude of *London*, altho' the Place be East or West 90 Degrees, more or less from *London*: and this Property belongs to all the Heavenly Bodies.

What I have said upon this Head, generally belongs to Seamen and Travellers: But to those that live any where in *England*, the Meridian-Distance is but little from *London* East or West; there needs not any such allowance for the Sun's Right Ascension to be made.

Now, in order to find the true Hour of the Night, you must first find the time of the *Star*'s southing; which is done, by subtracting the *Sun*'s Right Ascension from the *Star*'s, borrowing 24 Hours, if need require; and then, having taken the *Star*'s Altitude, and from it subtracted the Refraction answering, you must project the Oblique-angled Spheric Triangle, in which there are given AZ, the Complement of the *Star*'s Altitude, AP, the Complement of the *Star*'s Declination, and ZP, the Complement of the Latitude of the Place, to find the Angle at the Pole, which is the time between the *Star*'s southing, and the time you are seeking; which, if the *Star* be short of the Meridian, must be subtra-

cted from the time of ſouthing ; but if the *Star* be paſt the Meridian, the Angle at the Pole muſt be added to the time of the *Star*'s ſouthing ; the Sum, or Difference is the true Hour of the Night.

Example. Admit, *Jan.* 2, 1734, in the Latitude of 52° 48′, the Altitude of the Head of *Andromeda* was obſerved 46 Degrees paſt the Meridian. I demand the true Hour of the Night?



OPERATION.

	h.	′
Right Aſcenſion of the Star,	23	55
Right Aſcenſion of the Sun,	19	40
Remains the time of Southing,	4	15

Now for the Angle ZPA.

		°	′		°	′
Sides	AP	62	23			
	AZ	44	00			
	ZP	37	12			
	Z =	143	35	—		
	Half =	71	47	—	71	47
	AP =	62	23	ZP =	37	12
	X =	9	24	X =	34	35

SAP

	°	′		
SAP	62	23	Co Ar.	0.052533
SZP	37	12	Co Ar.	0,218533
SX	24	35		9.754046
SX	9	24		9.213055

Z Logarithms — —				19.238167
Half Z=S. 24 35 —				9.619083
	h.	″	″	
Double 49 10 = ∠ ZPA =	3	12	40	
Time of ſouthing add	4	15	00	
True Hour of the Night	7	27	40	

Example 2. Admit at *London, Jan.* 18, I obſerve the Altitude of *Pollux* to be 50° ſhort of the Meridian. I demand the true Hour of the Night?

The above-mentioned Scheme may ſerve our turns well enough for this purpoſe. In which, let AZ be the Complement of the Star's Altitude 40°, AP the Complement of its Declination, 61° 21′, ZP the Complement of the Latitude of *London*, the Place of Obſervation 38° 28′, to find the Angle at the Pole?

Firſt, For the time of Southing.

	h.	′
Right Aſcenſion of the Star,	7	28
Right Aſcenſion of the Sun ſub.	20	47
Time of Southing — —	10	41

For the ∠ at the Pole.

		°	′			°	′
Sides	AP	61	21				
	AZ	40	00				
	ZP	38	28				
	Z =	139	49				
	Half	69	54			69	54
	AP =	61	21		ZP =	38	28
	X =	8	33		X =	31	26

S. AP	61	21	Co Ar.	0.056721
S. ZP	38	21	Co. Ar.	0.206168
S. X	31	26		9.717259
S. X	8	33		9.172230
Z Logarithms				19.152378
Half S.	22	08		9.576189

	h.	′	″	
Doubled 44 16 = ∠ ZPA =	2	57	4	subtract.
From the time of Southing	10	41	0	
True time of the Night	7	43	56	

Thus you see, how readily and exactly may the Hour of the Night be found at any Time and Place, when the Stars are seen; or by the Moon and other Planets: But then it will require more Labour, because of their swift Motion in Longitude. But when their true Declinations and Right Ascensions are found, the Work is the same, (except the Moon) in finding the ∠ at the Pole, the time of Southing, and from thence, the true Hour of the Night.

And now I am upon Explaining how to find out true Time, it will not be amiss to say a Word or two to those whose Business it is to look after Time-keepers, as Clock and Watch-makers, every one of which generally has a Movement, which they call a *Regulator*. This is their Standard, by which they set Gentlemens Watches. I am very sensible there are not Two of these Regulators in *London* the same Time; yet they all tell you they are right, and that each his Machine keeps Time to a Miracle. But alas! when I come to enquire into the Foundation of their Time, by

by what they have ſet their Regulator, one ſays, he ſet his by St. *Paul*'s Clock, another by the Royal Exchange-Clock, another by the Dial in *Gray*'s Inn Walks, another by *Covent-Garden* Dial, on a Day when there was no Equation; another ſets his by the *Temple*-Dial; and poſſibly, another by ſome Dial on an Houſe-ſide. Indeed, a Dial well made, and truly ſet, will keep apparent Time true enough; but I know not one, altho' he can make the Dial ever ſo well, that can ſet it true when he has done; ſo that if the Dial be ever ſo truly made, if it is not truly ſet, it will give you wrong Time; and conſequently, all Movements ſet by ſuch Dials muſt of neceſſity err, altho' the Movement will keep good Time to what it was ſet; yet becauſe it was ſet upon a wrong Baſis, the Time ſhewn by it is falſe, as I have daily proved.

Now to put them all to rights, they muſt learn ſo much of Aſtronomy, as will inform them of this matter, my *Syſtem*, Vol. I. Prob. 17. and this Book will give any one ample ſatiſfaction.

Now, to make this intelligible to the meaneſt Capacity, thoſe that are minded to be Maſters hereof, muſt be provided with a good *Aſtronomical Quadrant*, as mentioned at the beginning of this Chapter, and is hereafter more largely deſcribed; and then, by the Latitude of the Place, and Altitude of the Sun or Star, the true Hour of the Day or Night may be found, which is the apparent Time; and becauſe good Clocks and Watches keep equal Time, whatever the Equation of Time is, ſet your Regulator accordingly.

Then on any of Days when the Equation vaniſhes, make Obſervation, and ſee if your Regulator and the Sun be together; if they are, then is the Regulator right; elſe not.

Make Obſervation on the Day when the Equation is the greateſt; as, ſuppoſe at the latter End of *January*, if then the Regulator be 14 Minutes, 41 Seconds too faſt for the Time obſerved, then is your Regulator right, elſe not.

And thus may you prove it any Day or Night at pleaſure, and keep it to that juſt Time, that it may be a perfect true Regulator.

There is but one thing more which I have to remind my Reader of in this Affair; which is, if he sets his Regulator by a Sun-Dial, it ought not to be done early in the Morning, or late in the Afternoon: For then the Shadow on the Dial is not the true Hour of the Day, in regard the Sun hath then considerable Refraction, which makes the Sun appear higher than really he is; and the nearer the Horizon, the greater is this Error of Time shewn by the Dial; so that all Sun-Dials go too fast in the Forenoon, and too slow in the Afternoon, be they ever so well made and truly set.

Therefore if you are sure of such a Dial's Truth, then if it is an Horizontal or South Erect-Direct Dial, set your Regulators as near Noon as possible: For the Refraction is the least, and consequently the Time is then the truest.

But if you are to observe the Time by the Direction above-given, let the *Sun* or *Star* (if possible) be an Hour and half, or two Hours from the Meridian; for the Altitude from Ten in the Morning, till Two in the Afternoon alters but little, *viz.* in a *Ratio* proportional to the Natural Sines.

CHAP.

CHAP. XI.

How to obſerve the Sun's true Place, other Ways than is ſhewn in the 41ſt *Problem of my* Syſtem.

IN the 5*th* Page of this Book I have told you, that theſe Obſervations were taken with a new-invented Quadrant anſwering to a Radius of 270 Feet. Which Quadrant is made by Mr. *John Barſton* of *Chelſea*, Watch-maker (where any Gentlemen may have them, either with, or without Seconds) and has been try'd by ſeveral able Aſtronomers and Navigators, being found to anſwer moſt exactly its intended Ends, and to excel all others in theſe following Particulars, *viz.*

1. It requires no Shade from the Sun:

2. Nor any viſible Horizon.

3. 'Tis not ſo liable to be affected by the Motion of the Ship.

4. An Obſervation may be taken with it in the Night (of which there are more frequent Opportunities than in the Day) either of the Moon or Fixed Stars, and the Latitude be thereby exactly determined.

5. In this Inſtrument there is nothing required, but that you ſee the Object, *viz.* Sun, Moon or Star: Whereas in all the Inſtruments now uſed, there are more things than one required, to be ſeen at the time of taking the Obſervation; beſides the Difficulty of moving the ſliding Pieces with the Finger, which, while the Obſervator is doing, the Opportunity of taking the Obſervation is many times loſt.

6. It divides a Degree into 60 equal Parts, and thereby the Altitude is determin'd to a Minute, and conſequently the Latitude of the Place to a Mile at Sea.

That it does really excel all others in the foresaid Particulars, has never been questioned by any who has seen it, and is an experienc'd Navigator: And it has been affirmed by several, that had there been such an Instrument in use in the time of Sir *Cloudesly Shovell*, the Loss of that Honourable Gentleman, and of all those unfortunate Persons who were with him, had been prevented.

Therefore I recommend it to all Astronomers and Navigators, as the most useful Instrument that was ever yet made.

One of these made (Inches Diameter,)	Answers to the Radius of one made the *common way*
18	270 Feet.
15	225
12	180
9	135
6	90
3	45
2	30
1	15

Given, the Latitude of the Place, the Hour of the Day, and the Sun's true Altitude; to find the Sun's true Place in the Ecliptic?

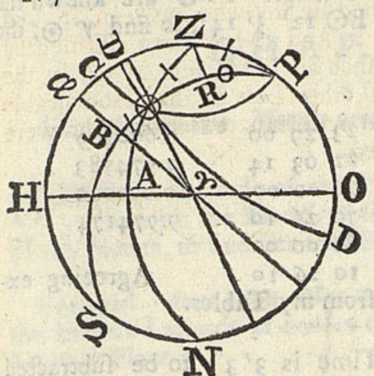
Example. At *London*, ♀ *May* 21, 1731, at 2 Hours P. M. Apparent Time, I observed the Sun's apparent Altitude 52 Degrees, 13 Minutes, 15 Seconds. I demand the Sun's true Place?

OPERATION.

	°	′	″
Apparent Altitude	52	30	15
Refraction sub.			41
True Altitude	52	29	34

Pro-

Projection. Draw the Primitive Circle ZHO, quarter it, and draw HO for the Horizon; set off the Latitude 51° 32′ from O to P, and from Z to œ draw œ ♈ for the Equinoctial; with the Secant of 30° (the time from Noon) draw PBS; and with the Co-Tangent of the Altitude 37° 30′ 26″ draw the Parallel of Altitude C☉P; where this cuts the Meridian P☉S, which is at ☉, draw the Azimuth Z☉N;



and lastly, draw ☉ ♈ for the Ecliptic, and C☉D for the Parallel of the *Sun*'s Declination.

And now there are given (1.) ZP the Complement of the Latitude 38° 28′. (2.) Z☉ the Complement of the *Sun*'s Altitude 37° 30′ 26″, with the time from Noon = ∠ ☉PZ 30°, to find the Side ☉P the Complement of the *Sun*'s true Declination. Let fall the Perpendicular ZR, and then say,

	° ′ ″	
As C.t. —	38 28 00	10.099913
To Radius	90 00 00	10.000000
So C.S. ∠ P	30 00 00	9.937531
To *t*. RP	34 31 47	9.837618

As C.S. ZP	38 28 00 Co Ar.	0.106255
To C.S. Z☉	37 30 26	9.899425
So C.S. RP	34 31 47	9.915139
To C.S. ☉R	33 24 59	9.921519
Z Sub.	67 56 46	
From	90 00 00	
Sun's true Decl. = ☉	22 3 14 North.	

Now

Now in the Rect-angled Triangle ♈B☉ are known the *Angle* B ♈ ☉ 23° 29′, and B☉ 22° 3′ 14″, to find ♈ ☉, the Sun's true Longitude?

	° ′ ″	
As S. ∠ B ♈ ☉	23 29 00	9.600409
To SB☉	22 03 14	9.574583
So Radius	90 00 00	10.000000
To S ♈ ☉	70 26 10	9.974174
Sub. 2 Signs = ♊	60 00 00	
Sun in ♊	10 26 10	

Agreeing exactly with the Calculation from my Tables.

Note, The Equation of Time is 3′ 3″, to be subtracted from apparent Time.

When the Sun is more than 45 Degrees from the Equinoctial Points, the Sines encrease so very slow, that a few Seconds in the Declination make a considerable Alteration in the Sun's Place; so that it requires exquisite Instruments to make the Observations withal.

CHAP.

CHAP. XII.

How to find the Moon's true Place by Observation.

GIVEN the Latitude of the Place, the Hour of Observation, with the Moon's observ'd Altitude, and the Place of the Nodes, to find her true Place?

Example. *Anno* 1731, *May* 7, at 10, at Night, I observ'd the Moon's Latitude at *London* to be 23° 59′ 10″; what is her true Place?

The true Place of her North Node was then 9S. 8° 48′ 57″.

Before I proceed to the Solution of this Problem, I shall explain two useful Cases in Sphericks, which are these:

1. Given two Sides, with the Angles opposite to them, to find the third Side.

R U L E.

As the Sine of half the Difference of the given Angles,
To the Sine of half the Sum of those Angles;
So is the Tangent of half the Difference of the given Sides,
To the Tangent of half the Side required.

2. Given two Angles, and the Sides opposite to them to find the other Angle.

R U L E.

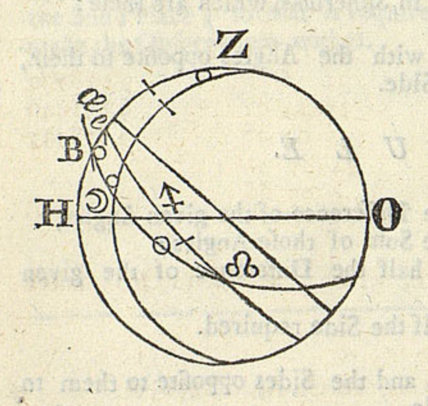
As the Sine of half the Difference of the given Sides,
To the Sine of half the Sum of those Sides;
So is the Tangent of half the Difference of the given ∠,
To the Co-Tangent of half the ∠ required.

And

And the three ſides of any Spheric Triangle are leſs than a Circle, or 360° : Alſo the three Angles taken together, are greater than two Right, or 180°.

Now, to proceed to the Solution of the Problem for the Moon's Place, thus :

	D.	h.	′	″
Anno 1731,	7	10	00	00
Equat. of Time add	0	00	04	01
Apparent Time	7	10	04	01
Sun's Place	♉	27	19	43
Sun's Right Aſc.		55	02	20
App. Time from *Noon*		151	00	15
R. A. M. *Cæli*		206	02	35
Medium Cœli ♎		28	02	55
Meridian Angle		69	01	17
Decl. Culm. Point South		10	47	58
Inclin. ☽ Orb = ∠ ☾☊ e		5	09	04



☞ In this Scheme the Moon is paſt the Meridian by the Diſtance B ☽ ; which is the reaſon that B ☽ is added to ☊ B in the following Work.

1. In the Triangle ☊ B e are known, (1.) ☊ e the Diſtance of the culminating Point from the neareſt Node = 2^s. 10° 46′ 2″. (2.) The ∠ B☊ e = 5° 9′ 4″, the Obliquity of the Orb, (3.) The Angle B e ☊, the Meridian Angle 69° 1′ 17″ ; to find the *Angle* ☊ B e, the *Angle* that the Moon's Orb makes with the Meridian, and the Sides ☊ B and B e. By the 3*d* Axiom of Oblique Sphericks.

1. For the Sides.

	° ′ ″
Angle B e ☊	69 01 17
Angle B ☊ e	5 09 04
Z	74 10 21
Half	37 05 10½
X	63 53 13
Half	31 56 06½

Side ☊ e	70°	46′	02″
Half	35	23	01

	° ′ ″		
As *S*. Half Z ∠ ∠	37 05 10	Co Ar.	0.219672
To *S* Half X	31 56 06		9.723420
So *t*. Half Cr. ☊ e	35 23 01		9.851440
To *t*. Half X of unkown Crs.	31 55 32		9.794532
2. As *C.S*. Half ∠ ∠	37 05 10	Co Ar.	0.098167
To *C.S*. Half X	31 56 06		9.928730
So *t*. Half Cr. ☊ e	35 23 01		9.851440
To *t*. Half unknown Crs.	37 04 38		9.878337
Half X — and +	31 55 32		
Rem. B e	5 09 06		
Sum is the side ☊ ☽	69 00 10		

3. For the *Angle* ☊ B e, which the Moon's Orb makes with the Meridian,

	° ′ ″		
As *S*. B ☊	69 00 10	Co Ar.	0.029839
To *S*. ∠ B e ☊	61 01 17		9.970214
So *s*. ☊ e	70 46 02		9.975058
To *S*. ∠ ☊ B e	70 47 12		9.975111

Moon's

	°	′	″
Moon's Altitude obſerv'd	23	59	10
Parallax Altitude +	0	50	57
Sum —— —	24	50	7
Refraction ſubtract	0	1	59
True Altitude	24	48	8
Complement = ☽ Z	65	11	52

4. In the Triangle Z☽B, to find the *Angle* ☽, the Parallactic *Angle* in the Moon's Orb.

	°	′	″	
As *S.* ☽Z	65	11	52	Co Ar. 0.042029
To *S.* ∠ B	70	47	12	9.975110
So *S.* BZ	67	29	4	9.965566
To *S.* ∟ ☽	73	56	15	9.982705
Complement	106	3	45	Obtuſe = *Angle* Z☽B.

To e œ Decl.	10	47	58
Add B e	5	9	6
Z = B e	15	57	4
+ œ *R*	51	32	0
♃ = B♃	67	29	4

5. To find the Side ☽B, the Operation ſtands thus:

	°	′	″		°	′	″		°	′	″
Angle ♃☽B	106	03	45	——	106	3	45	♃B	67	29	4
Angle ♃B☽	70	47	12	——	70	47	12	♃☽	65	11	52
♃	176	50	57	X	35	16	33	X	2	17	12
Half	88	25	28½	Half	17	38	16½	Half	1	8	36

	°	′	″	
As *S.* half X of the given Angles	17	38	16	Co. Ar. 0.518559
To *S.* half their ♃	88	25	28	9.999836
So *t.* half given ſides	1	8	36	8.300010
To *t.* half ☽B required	3	46	27	8.818405
Double is the ſide ☽B	7	32	54	paſt the Merid.
Add ☊ ☽	69	00	10	
Sum is ☊B	76	33	4	☽'s Diſt. à Node.

Place

	S.	°	′	″
Place of the Node —	9	8	48	57
Moon's Distance from Node sub.	2	16	33	4
Rem. Orbit Place of the Moon	6	22	15	53
Moon's Orbit-Pl. from New Tables	6	22	17	13
Difference			1	20

Thus have I given two practicable Methods, by which the true Places of the Sun and Moon may be found by Observation at any Place in the World; which, if at the same Hour their Places are calculated from my new Tables, the Difference of Meridians between that and *London* may be exactly determined.

Example. Suppose I am at *Jamaica* the 6th Day of *July* 1731, at half an hour past 10 at Night, and observe the Moon's Orbit Place (by the foregoing Method) to be ♑ 7° 35′ 3″; at the same Hour I compute the Moon's Place from my New Tables, under the Meridian of *London*, and find her Place to be ♑ 4° 28′. I demand the Difference of Longitude from *London*?

OPERATION.

Moon's Orbit Place at						
	Jamaica	♑	7	35	03	at 10 at Night.
	London	♑	4	28	00	
Difference			3	7	3	

Now say, If the Moon's Diurnal Motion give 24 Hours, or 360° (either will do,) what will the Difference of the Moon's Place give? What comes out, is the Difference of Meridians, if you took 24 Hours for the middle Term; or the Difference of Longitude in Degrees, if 360° was the middle Term.

Now

Now ſay,

If 14° 46′ : 360° : : 3° 7′ 3″
60   60

886   187
60   60

53160   11223
360

673380
33669

53160)4040280(76°
37212

31908
31896

120
60

)7200(0′ [illegible]

Anſwer 76° *Jamaica* lies to the Weſt of *London.*

Example 2. Admit at Fort St. *George* in the *Eaſt Indies*, on the 24th of *Auguſt* 1731, at 6 h. 15 min. P. M. the Moon be obſerved in *Libra* 14° 98′ and at 6 h. 15 min. at *London.* I find by Calculation her Place to be *Libra* 17° 24′. I demand the Difference of Longitude betwixt *London* and Fort St. *George* ?

OPERATION.

Moon's Orbit Place at	*London*	♎ 17° 24′	at 6h. 15′ P.M.	
	Fort St. *George*	♎ 14 38		
	Difference	2 46		

The

The Moon's Diurnal Motion is 12° 17′. Now say,

$$\text{If } 12^{\circ}\ 17' : 360^{\circ} :: 2^{\circ}\ 46'$$

```
       60          60
      ----       ------
      737         166
                  360
                 ------
                 9960
                 498
                 ------
              737)59760(81°
                  5896
                 ------
                   800
                   737
                 ------
                    63
```

Anſwer, 81 Degrees to the Eaſt of *London*.

By the foregoing Examples it is plain, that if the Moon's Place obſerved, be leſs than it is at *London*, by Calculation for the ſame time, then the Meridian of the Obſervation lies to the Eaſt of the Meridian of *London*; if it be the ſame, then the Obſerver is under the Meridian of *London*; but if it be more than at *London*, the Place of the Obſervation is to the Weſt.

And the reaſon is very obvious: For the Longitude of any Place from *London* is always equal to that which is meaſured out by the Motion of the Moon, &c. in the time that is elapſed between one Meridian and another: As in the laſt Example, I have found the Difference of Longitude to be 81° = 5 h. 24′. Now the Motion of the Moon in that time is 2° 46′, according to her Diurnal Motion of 12° 17′.

And here I give you to underſtand, that for every Minute that you miſs of the Truth of the Moon's Place, you will err 27 Miles in Longitude, according to the Mean Motion of the Moon, as I thus prove:

If 13° 10′ 35″ : 360° :: 1′ : 27′ ?

2. The Longitude of any Place from *London* may be found by obſerving the time the Moon is upon the Meridian of that particular Place: For if you find the time of the Moon's Southing where you are to be, the ſame that it is at *London*, then you are under the Meridian of *London*; but if the time where you are be leſs than at *London*, you are to the Eaſt; if more, to the Weſt.

Therefore if there be any Difference, turn it into Degrees, and then ſay,

As the Moon's Diurnal Motion, is to 360°, what is this Difference, to work by a direct Ratio, and what comes out, is the Difference of Longitude.

Example. Admit, *Jan.* 9, 1731, I am at Sea, in the Latitude of 43 ½ North, and obſerve the Moon upon the Meridian of the Place at 10 h. 17′ P.M. apparent Time. I demand the Longitude of Obſervation from *London*, and of what Denomination?

OPERATION.

		h.	′
Moon South at	*London*	10	17
	obſerved	10	5
		0	12 = 3°

Now ſay,

As 11° 48′ : 360° : : 3 : 91° 31′ to the Eaſt of *London*.

N.B. This way of Reaſoning will require moſt accurate Inſtruments, and the greateſt Care imaginable, in uſing of them: For every Minute in Time that you err in the time of the Moon's Southing, will produce an Error of 408 Miles in Longitude, according to the middle Motion of the Moon, thus proved:

$$\text{As } 13^{h}\ 10^{'}\ 35^{''} : 360^{\circ} :: 15^{\circ} : 408 \text{ Miles.}$$

Note, 1 in Time is equal to 15ſ in Motion, which is here the third Term.

CHAP. XIII.

To find the Moon's Viſible Place.

THE Place of the Moon (and of all the Heavenly Bodies) is calculated as view'd from the Earth's Center, and this is called the *True Place*: But becauſe we are removed from thence 3984.58 Miles, when we view the Moon from the Earth's Surface, we do not behold her in the ſame Place as an Eye would do from its Center; therefore my Buſineſs in this place ſhall be to reconcile this matter, and make the whole Proceſs as intelligible as poſſible.

When the Moon has no Latitude, then the 39th Problem of my *Syſtem* will anſwer your End: But becauſe ſhe has generally Latitude, more or leſs, it will render the Calculation a little more intricate (than is there ſhewn,) as will appear by the ſubſequent Example.

Anno 1727, *September* 15th, at 10 at Night, at *London*, Apparent Time. I would know the Moon's Viſible Place in Longitude and Latitude?

This being a Problem perfectly new, and attended with ſome Difficulty, I ſhall endeavour to make it as plain as poſſible to the meaneſt Capacity.

1. With the true Place of the Node $11^{s}\cdot 21^{\circ}\ 37'\ 58''$, take out the Inclination of the Moon's Orb, with the Equinoctial (Page 71, of my *Syſtem*) $28^{\circ}\ 16'\ 44''$; and then ſet down the Requiſites, thus:

		D.	h.	′	″
Given Apparent Time 1727, *September*		15	08	00	00
Equation of Time sub.	—			08	46
Equal Time —	—	15	07	51	14
Moon's Orbit Place from New Tables		♒	25	07	47
Reduction add	——			05	49
Ecliptic Place —	—	♒	25	13	36
Moon's true Latitude South Decef.			2	21	06
Sun's true Place, —	—	♎	3	06	59
Sun's Right Ascension	—		182	51	31
Moon's Right Ascension			32	19	46
Apparent Time from Noon add			120	00	00
Sum is Right Ascension *M. Cœli*			302	51	31
Complement — —	—		57	08	29
Angle of Moon's Orb with the Equinoctial			28	16	44

Now, for the *Medium Cœli* in the Moon's Orb, *&c.* by Problems 27, 28, 29, 30, 31, 32, 33, of my *System.* Find the Requisites, only here make use of the Obliquity of the Moon's Orb 28° 16′ 44″, instead of the Obliquity of the Ecliptic 23° 29′.

		°	′	″	
As Radius — —		90	00	00	10.0000000
To C.S. Obliquity of ☽'s Orb		28	16	44	9.944850
So *C.t.* R.A. *M. Cœli*		57	08	29	9.810168
To *C.t.* of its Dist. from ♈ sub.		60	21	57	9.755018
From *Aries*, or	12S.	00	00	00	
Rem. ☽'s Orbit Place on Merid.	9	29	38	03	
But in the Ecliptic	♒	00	38	35	

2. For the Meridian Angle in the Moon's Orb.

	°	′	″	
As Radius — —	90	00	00	10.0000000
To S. Obliquity Orb	28	16	44	9.675561
So C.S. R.A. *M.C.*	57	08	29	9.734454
To C.S. Merid. Angle ☽'s Orb	75	06	18	9.410015

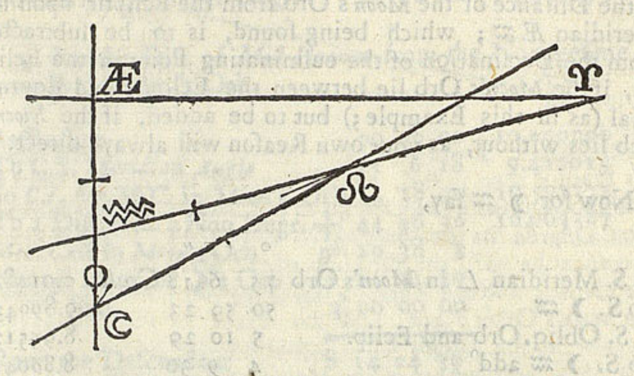
3. To

3. To find the Declination of the culminating Point in the Ecliptic.

	° ′ ″	
As Radius —	90 00 00	10,000000
To T. Obliq. of the Eclip.	23 29 00	9.637956
So S. R. A. *M.C.* in Eclip.	57 08 29	9.924286
To *t*. Declin. Culm. Point	20 03 00	9.592242

4. To find the Declination of the Culminating Point in the *Moon*'s Orb.

First, Find the samePoint'sDeclination in the Ecliptic,as in the *Third* above; and alſo the *Medium Cœli* in the Ecliptic, which in this Example is ♒ 0° 38′ 35″; from which Place in the Ecliptic, always ſubtract the Place of the neareſt Node, and you will have the Diſtance of the ſaid Node in



the *Medium Cœli* in the Ecliptic, which in this Scheme is equal to ☊ ♒ 1S. 20° 59′ 23″, the Angle ☊ ☽ ♒ is the Meridian Angle in the *Moon*'s Orb = 75° 6′ 18″ found in the Second, and the Angle ☽ ☊ ♒ is 5° 10′ 29″, being the Inclination of the *Moon*'s Orb and Ecliptic, and is thus obtained;

	° ′ ″	
As Radius —	90 00 00	10.000000
To S. greatest X of Obliq.	0 17 45	7.712791
So S. Dist. ☽ à ☉	37 53 23	9.788270
To S. add	0 10 54	7.501061

Now you are to observe, that if the Distance of the *Moon* from the *Sun*

		° ′ ″	
be	3, 4, 5, 9, 10, 11 Signs, add to	4 59 35	the
	0, 1, 2, 6, 7, 8 Signs, sub. from	5 17 20	

Sum or Difference is the true Obliquity of the *Moon*'s Orb with the Ecliptic at that time.

So in the Example above it is 5° 10′ 29″.

Now in the Triangle ☊ ☽ ♒ we are to find ☽ ♒, which is the Distance of the *Moon*'s Orb from the Ecliptic upon the Meridian Æ ♒; which being found, is to be subtracted from the Declination of the culminating Point in the Ecliptic, if the *Moon*'s Orb lie between the Ecliptic and Equinoctial (as in this Example;) but to be added, if the *Moon*'s Orb lies without, as your own Reason will always direct.

Now for ☽ ♒ say,

	° ′ ″	
As S. Meridian ∠ in *Moon*'s Orb	75 6 18 Co Ar.	0.014844
To S. ☽ ♒	50 59 23	9.890439
So S. Obliq. Orb and Eclip.	5 10 29	8.955129
To S. ☽ ♒ add	4 9 30	8.860412

Now, because the Angle of the *Moon*'s Way with the Equinoctial is more than the Obliquity of the Ecliptic, ☽ ♒ must be added to Æ ♒. See the Table in my *System*, Pages 71, 72.

To

	°	′	″
To Æ ♒, as found in the *Third*	20	00	00
Add ♒ ☽	4	09	30
Sum is Æ ☽, the Declination of the Culm. Point in ☽'s Orb	24	09	30
Alt. Equator at *London*,	38	28	00
Alt. *M.C.* in the *Moon*'s Orb	14	18	30

4. For the Altitude of the Nonagesime Degree in the *Moon*'s Orb.

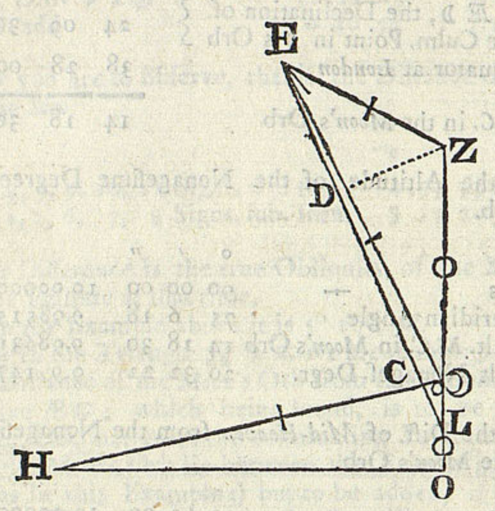
	°	′	″	
As Radius —	90	00	00	10.000000
To S. Meridian Angle	75	6	18	9.985156
So C.S. Alt. *M.C.* in *Moon*'s Orb	14	18	30	9.986319
To C.S. Alt. Nonagef. Degr.	20	32	22	9.971475

5. For the Dist. of *Mid-Heaven* from the Nonagesime Degree in the *Moon*'s Orb.

As Radius —		90	00	00	10.000000
To C.S. *Meridian Angle*		75	6	18	9.410015
So *C.t.* Alt. *M.C.* in *Moon*'s Orb		14	18	30	10.593372
To *t.* Dist. *M.C.* à Non. Degr. +		44	46	36	10.003387
Med. Cæli in *Moon*'s Orb	9s.	29	38	3	
Nonag. Degr. in ☽'s Orb	11	14	24	39	
Sub.	3	00	00	00	
Rem. the Descendant	8	14	24	39	
Moon's true Orbit Place	10	25	7	47	
Rem. ☽ from the Descend.	2	10	43	8	
From the Nonag. Degree	0	19	16	52	

6. To find the *Moon*'s true Altitude.

In this Scheme, E represents the Pole of the *Moon*'s Orb,



Z the Zenith, ☽ the true, and L the visible Orbit Place of the *Moon*; then is EZ, the Distance of the Zenith from the Pole of the *Moon*'s Orb, equal to the Altitude of the Nonagesime Degree in the *Moon*'s Orb 20° 32′ 22″; ☽E is always known to be 90°, the distance of the *Moon* from the Pole of her Orbit; and the Angle ☽EZ being the difference between the *Moon*'s Orbit Place, and the Place of the Nonagesime Degree in the *Moon*'s Orb equal to 19° 16′ 52″, to find Z☽, the Complement of the *Moon*'s true Altitude.

Let fall the Perpendicular DZ, and then say,

	°	′	″	
As *C.t.* ZE Alt. Nonag.	20	32	22	10.426351
To Radius	90	00	00	10.000000
So C.S. ∠ ☽EZ Diff. Lon.	19	16	52	9.974931
To *t.* DE, the 4th Arch	19	28	35	9.548580
From ☽E	90	00	00	always the same.
Rem. ☽D, the 5th Arch	70	31	25	

As C.S. 4th Arch = DE	19 28 35	Co Ar.	0.025589
To C.S. 5th Arch = D☽	70 31 25		9.522989
So C.S. EZ Alt. Nonag.	20 32 22		9.971475
To S. O☽, the true Alt.	19 20 23		9.520053

7. For the Parallactic Angle = H☽O in the Moon's Orb.

	° ′ ″	
As Radius	90 00 00	10.000000
To t. O☽ her true Altitude	19 20 23	9.545274
So C.t. H☽, *Moon* from Descend.	70 43 8	9.543851
To C.S. H☽O, the Parall. Angle	82 56 51	9.089125

8. For the *Moon*'s Horizontal Parallax.

1. For the *Moon*'s Eccentricity.

	° ′ ″		
As S. Equation Apogeon	6 00 49	Co Ar.	0.979785
To the constant Number	11731 ;		4.069354
So S. double Annual Argum.	35 28 22		9.763664
To the *Moon*'s Eccentricity	64983		4.812803

But more Correctly thus: Supposing the Logarithm of the mean Distance of the *Moon* from the Earth to be 10.0000000.

RULE.

To the Excess of the Co Secant of the second Equation of the Apogeon above the Radius, add the Sine of the Double of the Annual Argument, and the Constant Logarithm 8.0691869, and you will have the Logarithm of the *Moon*'s true Eccentricity at that time.

OPE-

OPERATION.

	° ′ ″		
Second Equation of Apog.	6 0 49	Co Sec.	.9797852
Double *Annual Arg.*	35 28 22	Sine	9.7636646
Constant Logarithm	----		8.0691869
Logarithm of the Eccentricity,			8.8126367
Reject 4 from Characteristic, then 64958			4.8126367

2. For the Moon's Distance from the Earth.

	° ′ ″		
As S. Elliptic Equation	3 22 25	Co Co Ar.	1.230479
To double Eccentricity	129966		5.113829
So S. ∠ at upper Focus	29 6 8		9.686966
To Dist. *Moon* from the ⊖	1074173		6.031074

But more correctly, thus, supposing the Logarithm of the mean Distance of the *Moon* from ⊖ to be 10.0000000.

RULE.

Take the Sum and Difference between the true *Anomaly* and *Angle* of the Upper Focus; and also the half of Sum and Difference.

Then to the Sine of the *Angle* at the Upper Focus, add the Excess of the Co Secant above the Radius of the half Sum, and the Secant of the Radius of the half Difference: The Sum of these three shall be the true Logarithm of the Distance of the Moon from the Earth.

Example to the time above.

OPERA-

OPERATION.

	S.	°	′	″		
True Anomaly	11	4	19	22		
Angle at Upper Focus	11	0	53	52	Sine	9.6871325
Sum	10	5	13	14		
Half	5	2	36	37	Co Sec.	.3362300
Difference	0	3	25	30		
Half	0	1	42	45	Sec.	.0001940
Logar. of *Moon*'s Distance from the *Moon*						10.0235565

3. For the *Moon*'s Horizontal Parallax in the *Syzygia.*

Now because Sir *Isaac Newton* makes the mean Horizontal Parallax of the *Moon* in the *Syzygias* 57′ 30″, and in the Quadratures 59′ 40″, the difference being 2′ 10″ = 130″, therefore we must find what it will be to the Distance of the *Moon* from the *Sun* at any particular time, thus, in the Example above the distance of the *Moon* from the *Sun* is 4^S. 22° 6′ 37″.

Now say,

As Radius —	90 00 00	10.000000
To whole diff. of ☌, ☍, and □	130″	2.113943
So S. Dist. ☽ à ☉	37 53 23	9.788270
To the 4th proportional Number	79.8	1.902213

Then, if the Distance of the *Moon* from the *Sun*

be { 0,1,2,6, 7, 8 Signs, add to 57′ 30″ } the Sum or
{ 3,4,5,9.10,11 Signs, sub. from 59 40 } Difference is the Parallax, according to the Distance of the *Moon* from the *Sun* at that time; so in the Example above, the proportional Number 1′ 19″.8 is to be subtracted from 59′ 40″, there remains 58′ 20″.

Now for the Horizontal Parallax of the *Moon*, say,

As

As present Dist. of ☽ à ⊖ —			10.0235565
To the Mean — —			10.0000000
So S. Horiz. Parall. of Dist. ☽ à ☉	58°	20′	8.2296079
To S. true Horizontal Parallax	55	15	8.2060514

9. For the Parallax of the *Moon* in Altitude.

	° ′ ″	
As Radius —	90 00 00	10.000000
To C.S *Moon*'s Altitude	19 20 23	9.974775
So S. Horizontal Parallax	0 55 15	8.206026
To S. Parall. in Altitude L ☽	0 52 01	8.180801

10. For the *Moon*'s Parallax in Longitude.

	° ′ ″	
As Radius —	90 00 00	10.000000
To C.S. Parallactic Angle	82 56 51	9.089123
So *S*. Parallax in Altitude	00 52 01	8.179901
To *t*. Parallax in Longitude	00 06 24	7.269024

11. For the Parallax in Latitude.

	° ′ ″	
As Radius —	90 00 00	10.000000
To S. Parallax in Altitude	00 52 01	8.179851
So S. Parallactic Angle	82 56 51	9.996701
To S. Parallax in Latitude	00 51 38	8.176552

12. To find the Parallax in Longitude by the Log. Logar.

OPERATION.

	° ′ ″	
Horiz. Parallax of the *Moon*	00 55 15	LL 2.964181
Altit. Nonagesim. Deg. in ☽ Orb	20 32 22	S. 9.545124
Dist. Moon from *Nonag. Degr.*	19 16 52	S. 9.518781
Parallax Longit. of the Moon	00 06 24	LL 9.028086

13. To

13 To find the Parallax in Latitude by the Log. Logarithms.

OPERATION.

	°	′	″		
Horizontal Parallax of the Moon	00	55	15	LL	9.964181
Altit. of Nonag. Degr in ☽ Orb	20	32	22	C.S.	9.971475
Parall. in Latitude of the Moon	00	51	44	LL	9.933656

N. B Because of the Smallness of the Triangle C☽L in Page 152, the Sides may be reduced into Seconds, and so resolved as a plain Triangle.

And because the Moon is in the Occidental Quadrant, the Parallax in Longitude must be subtracted; see my *System* Page 179.

		°	′	″
Moon's true Ecliptic Place	♒	25	13	36
Parallax in Longitude sub.			6	24
Moon's visible Longitude	♒	25	07	12
Moon's true Latitude South		2	21	6
Parallax in Latitude add			51	38
Moon's Visible Latitude South		3	13	07
Moon's true Altitude		20	12	48
Parallax in Altitude sub.		00	52	01
Moon's visible Altitude		19	20	47
Refraction add			2	38
Moons Altitude corrected		19	23	45

By what goes before, it is plain, that the Parallaxes and Refractions are of a contrary kind, *viz.* where the one is added, the other is subtracted, & *contra*; see my *System*, Page 177.

Note, When the *Sun* and *Moon* are not conjoined, as in the Example above, then you must find the Parallaxes of the *Moon*, and not of the *Moon* from the *Sun*, as is done in the next Example.

In the Triangle ☽EZ, a certain Author advises to find the Angle E☽Z, and that shall be the Complement of the Parallactic Angle: But this never holds true, but when the

the Moon is at her greatest Limit of Latitude, or 90 Degrees distant from her Nodes: For then doth the Circle of Longitude E☽ fall at right Angles upon the *Moon*'s Orb, and never else; so that at other times you must find the parallactic Angle, as I have shewn above.

Also, if you would find the Parallaxes by the Table of the *Parallaxes* hereunto annexed, you must enter with the Altitude of the Nonagesime Degree, and its Complement in the Moon's Orb, and not in the Ecliptic; for when the *Moon* has South Latitude (as in the Example above) the Altitude of the Nonagesime Degree in the *Moon*'s Orb is less than it is in the Ecliptic; but when the *Moon* has North Latitude, then 'tis more.

14. For the *Moon*'s apparent Diameter at the same time.

Here are three things to be considered.

1. In respect of the Horizon.

2. In respect of the *Moon*'s Altitude.

3. In respect of the *Moon*'s distance from the Earth.

For Sir *Isaac Newton* has determined the Horizontal Semidiameter in the *Syzigias* 15′ 45″, and in the Quadratures 15′ 31″ ½; therefore we must first find what the Horizontal Semidiameter will be, in respect of the Distance of the *Sun* and *Moon* at any given time, it will always hold.

	° ′ ″	
As Radius ———	90 00 00	10.000000
To the Diff. of Semid. in ☌, ☍, and □	13.5	1.130334
So Si Distance ☽ à ☉	37 53 23	9.788270
To the 4th proportional Part	8.3	0.918604

Now observe, if the Distance of the ☽ from the ☉ be { 0, 1, 2, 6, 7, 8 Signs, sub. from 15′ 45″ / 3, 4, 5, 9, 10, 11 add to 15 31½ } the Sum or Difference is the Horizontal *Semidiameter* in respect of the Distance of the *Sun* and *Moon* at the given time.

So

So in the Example before us, the Fourth proportional Number 8″.3 is to be added to 15′ 31″.5, and the Sum 15′ 39″.8 is the Moon's Horizontal apparent *Semidiameter*, according to the Distance of the Moon from the Sun 4ˢ. 22° 6′ 37″.

In the 34th Page of my *System of the Planets demonstrated*, I have proved, that the Heavenly Bodies are nearer the Observer when on the Meridian, than when in the Horizon, by near the Earth's Semidiameter: Whence it is manifest, that the Apparent Diameters of the Planets are least in the Horizon, and greatest in the Zenith; and are to each other at those respective Distances, as the Sines of those respective Distances from the Zenith.

For this purpose I have annexed the following Table, which enter with the Moon's Altitude 19° 20′ 23″; and because she is nearer the Apogeon than the Perigeon I take out the Augmentation of her Diameter 10″, therefore the Moon's apparent Semidiameter in respect to her Altitude is 15′ 44″.

Lastly, For the true apparent Semidiameter of the Moon in respect of her present Distance from the Earth.

	′	″		
As the Horiz. Parall. of Dist. ☽ à ☉	58	20	Co Ar.	878
To present Horizontal Parallax	55	15		358
So Apparent Semid. Altitude	15	45		5810
To true Apparent Semidiameter	14	55		6046

The Table is thus made:

The Moon's Zenith Diameter exceeds her Horizontal in Perigeon 36″. I would know, how much her Horizontal Diameter must be encreased at the Altitudes of 30 and 60 Degrees severally?

To Augment the Horizontal Diameter.

Alt. ☉ and ☽ °	The ☽'s Apog. ″	The ☽'s Perig. ″	☉'s Parallax. ″
0	0	0	10
2	1	1	10
4	2	2	10
6	3	4	10
8	4	5	10
10	5	6	10
12	6	7	10
14	7	9	10
16	8	10	10
18	9	11	10
20	10	12	10
22	11	13	10
24	12	15	9
26	12	16	9
28	13	17	9
30	14	18	9
32	15	19	8
34	16	20	8
36	17	21	8
39	18	23	8
42	19	24	7
45	20	25	7
48	21	27	7
51	22	28	6
54	23	29	6
57	23	30	6
60	24	31	5
63	25	32	5
66	26	33	4
69	26	34	4
72	27	34	3
75	27	35	3
78	28	35	2
81	28	35	2
84	28	36	1
87	28	36	1
90	29	36	0

OPERATIONS.

		° ′	
As Radius	— —	90 0	10.000000
To Diff. of Horiz. and Zenith Diameters		36″	1.556302
So S. Altitude ☽		30 0	9.698970
To the Quant. to be added to Horiz. Diam.		18	1.255272

Again,

		° ′	
As Radius	— —	90 00	10.000000
To Diff. of Horiz. and Zen. Diam.		36	1.556302
So *S.* Alt. ☽	— —	60 00	9.937531
To Quant. to be add. to Horiz. Diam.		31	1.493833

And after this manner is the Table calculated; in which is alſo given, the *Sun*'s Parallax anſwering to the Altitude.

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15. Find the Greateſt and Leaſt Horizontal Parallax of the Moon in the *Syzigia.*

1. For the Leaſt.

As the Greateſt Diſtance of ☽ à ⊖		6.0280736
To the mean Diſtance	—	6.0000000
So mean Hor. Parall. in the *Syzigia*	57° 30′	8.2233523
To S. Leaſt Horizontal Parallax	53 54	8.1952787

2. For the Greateſt.

As the Perigeon Diſtance of ☽ à ⊖		5.9700320
To the mean Diſtance	—	6.0000000
So S. mean Horizontal Parallax	57′ 30″	8.2233573
To S. Greateſt Horizontal Parallax	61 56	8.2533253

The Table in Page 110, differs a ſmall matter from this; becauſe that Table is made to ſerve as well for the Moon's Eclipſe as the Sun's.

16. To find the Moon's Greatest and Least Apparent Semidiameter in the *Syzigia*.

1. For the Least.

	'	''		
As mean Horiz. Parall. in the *Syzigia*	57	30	LL Co Ar.	815
To the mean Semidiameter	15	45		5809
So Apogeon Horiz. Parallax	53	54		466
To least apparent Semidiameter	14	46		6090

2. For the Greatest.

	'	''		
As the mean Horizontal Parallax	57	30	LL	185
To the mean Semidiameter	15	45		5809
So Perigeon Horizontal Parallax	61	36		114
				Z 299
To Greatest apparent Semidiameter	16	52		5510

Example 2. Let the Visible Place of the Moon be sought at the time of the Visible Conjunction of the Sun and Moon *Anno* 1737, *February* 18, 3 h. 4' 22'' at *London*. See the Synopsis, and mark it well.

	d.	h.	'	''
Given Apparent Time 1737, *February*	18	03	04	22
Equation of Time add			12	43
Equal Time — —	18	03	17	05
Moon's Orbit-Place —	11	11	30	35
North Node — —	05	17	57	29
Argument of Latitude —	05	23	33	06
True Latitude Moon North Desc.		00	35	33
Reduction add — —			01	33
Ecliptic Place —	11	11	32	08
Sun's Place — —	11	11	08	44
Sun's Right Ascension —		342	36	33
Apparent Time from Noon add		46	05	30
Sum is Right Ascension *Med. Cœli*		28	42	03
Angle Moon's Orbit with Equinoctial		18	54	08
Angle Moon's Orbit with Ecliptic		05	16	29

Di-

		°	′	″
Distance in the Equator to be subtracted		03	16	40
Culminating Point in the Moon's Orb	♉	00	03	30
Meridian Angle in the *Moon*'s Orb		73	29	31
Right Ascension *Med. Cœli* Moon's Orb		21	25	23
Declination of the Culm. Point Moon's Orb		07	11	05
Altitude Mid-Heaven in the Moon's Orb		45	39	05
Alt. Nonagesime Degree in the Moon's Orb		46	43	57
Nonagesime Degree in the Moon's Orb	♉	15	34	54
Descendant -- - ----	♒	15	34	54
Moon's Orbit-Place from the Descendant		45	55	41
Moon from the Nonagesime Degree	2	04	04	19
Moon's true Altitude ---		18	33	57
Parallactic Angle in the Moon's Orb		46	18	11
Second Equation of the Apogeon		08	55	58
Annual Argument	11	02	08	10
Mean Anomaly of the ☽	11	09	02	48
Angle at the Upper Focus	11	09	00	19
Elliptic Equation		02	22	46
The Moon's Eccentricity 62435 Logar. 4795428				
Distance of the Moon from the Earth 6.032457				
Horizontal Parallax of ☽ à ◐			53	11
Moon's Parallax in Altitude from the Sun			50	25
in Longitude ☽ à ☉			34	35
in Latitude ☽ à ☉			36	27
Moon's apparent Semidiameter			14	57
Moon's true Ecliptic Place	11	11	32	8
Parallax Longitude sub.			34	50
Moon's Visible Ecliptic Place	11	10	57	18
Moons true Latitude North Descend.			35	33
Parallax of Latitude			36	27
Visible Latitude ☽ South			00	54
Moons true Altitude		18	33	57
Parallax in Altitude of the Moon subtract		00	50	35
Visible Altitude of the Moon		17	43	22
Refraction add			02	30
Visible Altitude of the Moon corrected		17	45	52

These Parallaxes may all be found in the Tables of *Parallaxes*, and by the Logistical Logarithms, exactly agreeing with what was found before by help of the *Parallactic Angle*, and *Parallax* in *Altitude*.

By which it appears, that when you have found the Altitude of the Nonagesime Degree in the Moon's Orb, and the Distance of the Moon from the Nonagesime Degree, that then you may find the Parallax in Longitude and Latitude by the Logistical Logarithms more speedily than by the *Parallactic Angle*.

This Method of mine, of finding the Nonagesime Degree in the Moons Orb, *&c.* was entirely unknown to the the Antients, and consequently the Moons true Parallaxes were never truly found till now; as I have proved by many Examinations of the Works both of the antient and modern Astronomers.

They never knew a direct Method of taking the Nonagesime Degree in the Moons Orb, for want of ascertaining the true Obliquity of her Orb with the Equinoctial and Ecliptic; a Problem as useful in this Science, as the Light of the Sun is to the Eyes.

CHAP.

CHAP. XIV.

Of the Moon's Mean Motion, and how the Anticipations of the New Moons may be found by the Epacts.

IN my *Aſtronomical Definitions*, Vol. I. of my *Syſtem*, I have given, under the Word *Æ R A*, ſuch Periods of Time, as are moſt uſed in the known World : And becauſe it is by the Sun's (apparent) Motion that we meaſure Time, I ſhall make it my buſineſs in this Chapter to ſhew, how the true and mean Tropical Years are found, with their juſt Lengths ; which from my *Aſtronomical Tables* ſtand thus :

		d.	h.	′	″
Sun enters *Aries* 1733	*March*	9	2	9	35
Sun enters *Aries* 1734	*March*	9	7	58	37
True Length of the *Tropical Year*		365	5	49	2

The Operations of the mean Times ſtand thus :

	S.	°	′	″	‴
1733	9	20	58	21	00
Mar. 11	2	8	59	42	00
0 h. 47′			1	55	49
29″				1	11
☉ in ♈	0	0	00	00	00

	S.	°	′	″	‴	⁗
1734	9	20	44	1	0	0
Mar. 11	2	8	59	42	0	0
6			14	47	0	0
36			1	28	43	0
31				1	56	23
15						37
☉ in ♈	0	0	0	0	0	0

 From

From the mean Time that the Sun enters *Aries* 1734, take the mean Time that he enters *Aries* 1733, and the Difference is the true time of the Length of the Tropical Year, and the Work stands thus:

				d.	h.	'	"	‴
Anno	1734	Sun in *Aries*	*March*	11	6	36	31	15
	1733	mean Time	*March*	11	2	47	29	00
True Length of the *Tropical Year*				365	3	49	02	15

In the next place, we must find the true Length of the Lunar Year.

In order hereunto, we must first find the true Length of each mean Lunation, or the true length of each Synodical Month; which multiplied by 12, will give the Length of the Lunar Year, whose Difference from the Solar Year is the Epact, as is manifest from the following Work.

	d.	h.	'	"	‴
The Moon in one Hour moves nearly	00	00	32	56	27
Which makes the time of one Revolution	27	07	43	07	00

This known, then, either by the Single Rule of Three Direct, or by my *Astronomical Tables* in the Second Volumn of my *System*, You will find the Sun move in that time (according to apparent middle Motion) 26° 55′ 46″; the Moon (according to mean Motion) will move 26° 55′ 46″ in 2 days, 1 hour, 3 min. 2 sec. and the Sun in that time, 2 degr, 0 min. 52 sec. &c. as is here set down.

Time ☽'s Revolution,				*☉ moves in that time*			
d.	h.	'	"	°	'	"	
27	7	43	07	26	55	46	
2	1	03	02	2	00	52	
	3	40	09		09	03	
		16	29			41	
		01	14			03	
			05			00	12‴
29	12	44	6	29	6	25	12

By

By this it appears, that the mean Time between one Conjunction and another of the Sun and Moon, is 29 Days, 12 hours, 44 min. 6 ſec. which multiplied by 12 Months, gives 354 days, 8 hours, 49 min. 12 ſec. for the Length of the Lunar Year; which taken from the Solar Year, 365 days, 5 hours, 49 min. 2 ſec. 15‴, leaves 10 days, 20 hours, 59 min. 50 ſec. 15‴ for the Epact.

Or, the ſame may be found, by adding the time of the Lunation, 29 days, 12 hours, 44 min 6 ſec. to it ſelf 12 times; and then the Day of the Month that each Lunation ends upon, may be found by the Table of Days in my *Satellite Aſtronomy*, Page 94, as appears more at large by the Work.

Months.	D.	h.	′	″		
1	29	12	44	6		*January* 29.
2	59	1	28	12		*February* 28.
3	88	14	12	18		*March* 29
4	118	2	56	24		*April* 28.
5	147	15	40	30		*May* 27.
6	177	4	24	36		*June* 26.
7	206	17	08	42		*July* 25.
8	236	5	52	48		*Aug.* 24.
9	265	18	36	54		*Sept.* 22.
10	295	7	21	00		*Octob.* 22.
11	324	20	5	6		*Novemb.* 20.
12	354	8	49	12		*Decemb.* 20. Moon's Year.
	365	5	49	2	15	Sun's Year.
X	10	20	59	50	15	Epact.

But to avoid Fractions in Practice, the Epact is called 11, which, you ſee, is too much by 3 hours, 0 minutes, 9 ſeconds, 45‴.

Further, if you obſerve the Days of the Month of each Lunation in the Table above, wants juſt ſo much of 30, as is the Number of Months that we add to the Epact to find the ☽'s Age, or Day of Change, as *Street* in his Verſes has it, *viz*.

Jan. 0, 2, 1, 2, 3, 4, 5, 6,
8, 8, 10, 10, theſe to the Epact fix, &c.

Now, if the Length of the Solar Year 365 Days, 5 hours, 49 min. 2 ſec. 15‴ be divided by the mean Time of one Lunation, 29 Days, 12 hours, 44 min. 6 ſec. the Quotient 12 $\frac{5627415}{153078760}$ = 12 $\frac{1252787}{3401928}$ are the Number of Lunations in one Solar Year compleat.

Or, divide the Circumference of the whole Zodiac, 360, by 29 Days, 6 min. 25 ſec. the mean motion of the Sun in one Lunation, the Quotient 12 $\frac{38580}{504785}$, nearly the ſame as before are the Lunations in one Solar Year; which is in its loweſt Term 12 $\frac{7716}{100957}$.

Alſo, if the Length of the Solar Year, 365 days, 5 hours, 49 min. 2 ſec. 15‴ be divided by 27 days 7 hours, 43 min. 7 ſec. the ☽'s periodical Month, the Quotient 13 $\frac{52858675}{141635220}$, are the Number of Revolutions in a Solar Year Compleat.

Laſtly, If we divide 19 *Julian* Years by the time of one mean Lunation 29 days, 12 hours, 44 min. 6 ſec we ſhall have 235 $\frac{4590}{2551446}$, or in its loweſt Term, 235 $\frac{85}{47249}$, which are the Lunations that happen in 19 *Julian* Years; and 19 *Julian* Years are equal to 6939 days, 18 hours.

OPERATION.

```
     d.   h.
     365  6
      24
   ---------
    1466
    730
   ---------
    8766 Hours.
      19 Years.
   ---------
   78894
   8766
   ---------
24)166554(6939 d. — 18 h.
```

Then

Then, to find in what time 235 Lunations are made, allowing the time of one Lunation to be 29 d. 12 h. 44′ 6″, the Work stands thus:

If 1 : 29 d. 12 h. 44′ 6″ :: 235 ?

There doth come out 6939 Days, 16 hours, 43 min. 30 sec. which are less than 19 *Julian* Years by 1 hour, 16 min. 30 seconds. For,

	d.	h.	′	″
19 *Julian* Years are	6939	18	00	00
235 Lunations are performed in	6939	16	43	30
Difference		1	16	30

And consequently, the New Moons after 19 *Julian* Years will not return to the same Hour of the Day; but will happen 1 hour, 16 min. 30 sec. sooner; which in the space of 357 $\frac{2970}{4590}$ Years will amount to one intire Day, as appears by this Work:

d. ′ ″ Y. h. Y.
If 1 16 30 : 19 :: 24 257 $\frac{2970}{4590} = \frac{3}{5}$?

But, according to some Authors, it will be but 310 $\frac{150}{5295}$ Years; because they make the Length of the Lunar Synodical Month consist but of 29 days, 12 hours, 44 minutes, 3 seconds; therefore 235 Lunations are made in 6939 days, 16 hours, 31 min. 45 sec. which are less than 19 *Julian* Years by 1 hour, 28 minutes, 15 seconds.

But *Kingsley*, in his Ephemeris for the Year 1712, makes it 6939 days, 16 hours, 32 min. 28 sec. 5‴; that is, 1 hour, 27 min. 31 sec. 55‴ sooner.

The Lunations return in 19 Years, which amounts to one Day in 312 $\frac{180120}{315115}$ Years, nearly agreeing with *John Newton* in his *Cosmography*, Page 375.

See *Keil's Astronomical Lectures*, where he makes it but 304 Years that the Lunation will make up to compleat one whole Day.

Now

Now, how these Authors make the time of the mean Lunation to be only 29 days, 12 hours, 44 minutes, 3 seconds, they do not any where inform us: This is shorter than what I make it, by 3 Seconds. This difference may seem inconsiderable; yet in process of time it will make a considerable Error.

And now, because the New Moons do not return at the End of 19 Years, exactly at the same time of the Day, but 1 hour, 16 minutes 30 seconds sooner than they did 19 Years before; and that in 357 Years they will anticipate one Day; which proves that the Epact it self varies 1 in every 357 Years; that is, for every 357 Years past, one Day is to be subtracted; and for every 357 Years to come, the Epact is to be increased by 1; that is, when you have found the Epact in the *Julian* Account, according to the common method, for every 357 Years, from the Year of the *Nicene* Council 322 (some say, it was in the Year 325, *Booker* says, it was in 326,) you are to add 1 to the *Julian* Epact: And from the *Roman* Epact subtract so many Days from the *English* Epact, as are the difference between the two Accounts in that Century.

As, for Example; in the Year 1734, the *English* Epact is 6; from which take 11, the difference between the *Julian* and the *Gregorian* Epact (by borrowing 30) there remains 25, for the *Gregorian* Epact.

At the *Nicene* Council they placed the Golden Number right against the Day of the Month in the Kalendar, on which the *Moon* Changed, and so was of good use to find the Day of the New ☽, and also the Feast of *Easter*; but for the reasons above given, (concerning the Epact) the former of these is become wide of all Truth: The present Age has gained no less than Four whole Days, since the *Nicene* Council; that is, the Moon that Changed on the 29th Day of *December* then, will in this Age Change on the 25th Day of the same Month.

As, for Instance; I find a Number of Years between 1734 and the time of the *Nicene* Council, that being divided by 19, leaves for the Remainder, nothing; which Number of Years are 1406; which taken from 1734, leaves 328; in which

which said Years, *viz.* 328, and 1734, the Golden Number is 6; and in that Interval of Years there are Seventy four Revolutions of the Golden Number, and (near) Four of the Epact. By which I prove, that the Epact must be less in the Year 328, by 4, than it is in the present Year 1734, as appears more plain from the following Table, wherein I have placed the Years of the *Nicene* Council, and the Years of the present Age together, with the Golden Number to those Years, and also the Epacts answering each, severally; whose Difference of the Epacts, you see, are Four.

Epact	25	7	18	29	10
	322	323	324	325	326
	19	1	2	3	4
	1728	1729	1730	1731	1732
Epact	29	11	22	3	14

Epact	21	2	13	24	10
	327	328	329	330	331
	5	6	7	8	9
	1733	1734	1735	1736	1737
Epact	25	6	17	28	9

From this Table, it is plain, that if you take the Epact for any Year about the time of the *Nccene* Council, as suppose 322, the Epact was then 25; and add to it for the Month of *December* (according to Page 167) this Sum 25, taken from 60, leaves 25 for the Day of the New Moon; over-against which Day, in the Kalendar of our Common Prayer Book, you will find the Golden Number 19 placed, and so they placed the Golden Number over-against the Day in every Month on which the *Moon* Changed.

If

If therefore you place the 19 Golden Numbers, or Primes, right againſt the Day in each Month, on which the Moon Changeth, you will have a Table of the Days of the New Moons in this Age, and will ſerve for near 357 Years to come.

That my young Aſtronomical Reader may be furniſhed with every thing for his purpoſe (with things) of this kind, I ſhall here inſert the Calculations of the Sun's Ingreſs into the Equinoctial Sign *Aries* in the Year of Chriſt 322, it being the firſt Year of the *Nicene* Council, and is, from my Tables, as follows.

Equal Time at *London*.		Longit. ☉				Anom. ☉			
		S.	°	′	″	S.	°	′	″
Radix	301	9	10	9	10	6	26	54	40
Years	20	0	0	9	4	11	29	48	4
Years	1	11	29	45	40	11	29	44	37
March	20	2	17	51	58	2	17	51	45
Hours	4			9	51			9	51
Minutes	55			2	16			2	16
Seconds	35				1				1
Mean Mot.		11	28	8	0	9	14	31	14
Equat. add			1	52	0				
Sun in *Aries*		0	0	0	0				

But

But the mean Time of the Vernal Equinox happens thus:

Equal Time		Longitude Sun. S.	°	′	″
Radix	301	9	10	09	10
Years	20	00	00	09	04
Year	1	11	29	45	40
March	22	2	19	50	14
Hours	2			04	56
Minutes	22				54
Seconds	37				2
Sun in *Aries.*		00	00	00	00

At the beginning of this Chapter I told you, that the Sun enter'd *Aries* this Year 1734, *March* the 9th day, 7 hours, 58 min. 37 sec. under the Meridian of *London*; which is sooner than it did at the time of the *Nicene* Council by 10 days, 20 hours, 56 min. 58 sec. (not regarding the Difference of Meridians in this Case.)

The *Julian* Year, 365 days, 6 hours, exceeds the Tropical Year 365 days, 5 hours, 49 min. 2 sec. 15‴, by 10 min. 57 sec. 45‴; therefore to know in what time this will amount to a whole Day, say thus:

If 10′ 57″ 45‴ : 1 Year : : 24 h. : 131 Y. $\frac{14085}{39465}$ equal to 131 $\frac{2817}{7893}$ Years?

Here you see, that in 1412 Years the time of the Vernal Equinox has gone back 10 days, 20 hours, 56 min. 58 sec. so that if the *Julian* Year goes on thus, without any Correction, in Process of time the Sun will come to enter *Aries* on *Christmas* Day: And to know how many Years it will be 'ere it come to be so, is made manifest from this Work:

Dec. 6

Dec. 6
Jan. 31
Feb. 28
Mar. 9

D.

If 1 : 141.3569 :: 74 Days.

74

5254276
91949.83

9720.4106
1734 add

Year of Christ 11454 when the Sun will enter *Aries* upon *Christmas*-Day.

How ſtrangely will the Seaſons of the Year be alter'd, to what they are now, if any Perſon were to be alive to ſee it! But if the World endure ſo long, the People then living will not know any Alteration; becauſe this Alteration is made gradually, and by little and little; ſo that in an Age the Vulgar cannot perceive it.

If we examine this Time by the motions of the *Sun* and *Moon*, we ſhall find it too ſhort: However, this will ſerve our purpoſe well enough.

Booker, in his *Tractatus Paſchalis*, Page 5, tells us, that the Chriſtian Church have been always ſtudious and ſolicitous, as, not only the Biſhops, but the Oecumenical or General Councils have diligently preſcribed what time, and Day of the Year, with what Rite, and Ceremonies the Holy Feaſt of *Eaſter* ſhould be Celebrated; that all Controverſies which happen'd concerning the ſame in the Primitive Times, might be removed and taken away: Which was accompliſhed by the Firſt General Council at *Nice*, in the Year after Chriſt 326; the Canons, or Rules of which Council were,

Firſt, That the Equinoctial Day ſhould be obſerved upon the 21*ſt* Day of *March*.

Secondly,

Secondly, That the Full Moon happening upon the 21*st* Day of *March*, or the next Day after, ſhould be counted the *Full Moon* of the Month *Niſan* (which is part of our *March* and *April.*)

Thirdly, That the *Sunday* which next followed that ſucceeding *Full Moon*, ſhould be *Eaſter-Day*; but if the 14*th* Day of the *Moon* ſhould happen to be on the *Sunday*, then the next *Sunday* ſhould be *Eaſter-Day*.

And this is the Decree of the ſaid Council of *Nice*; for which there are theſe Reaſons:

Firſt, That there might be ſome Analogy, or Correſpondency between the *Jewiſh* and Chriſtian *Paſcha*, or *Eaſter*; but ſo, that the *Jewiſh* Solemnity might at no time concur with the Chriſtian Memorial of the Reſurrection of Chriſt.

Secondly, That at no time an Eclipſe of the Sun ſhould be ſeen at the Feaſt of *Eaſter*, as that, which was miraculous, at the Death of Chriſt, and, contrary to the Courſe of Nature, happening at the *Full Moon*, leſt it might give occaſion to the *Jews* and Infidels to calumniate the Chriſtians.

Now, becauſe our *Eaſter* can never fall lower than the Twenty ſecond Day of *March*, nor higher than the Twenty fifth Day of *April*, I will here ſubjoin a Table of its Limit, anſwering one Cycle of the *Moon*.

A TABLE

A TABLE *of* Easter-Limit.

G.N.	Limit.		G.N.	Limit.	
1	*April*	5	11	*April*	15
2	*March*	25	12	*April*	4
3	*April*	13	13	*March*	24
4	*April*	2	14	*April*	12
5	*March*	22	15	*April*	1
6	*April*	10	16	*March*	21
7	*March*	30	17	*April*	9
8	*April*	18	18	*March*	29
9	*April*	7	19	*April*	17
10	*March*	27			

The Use is, Having found the Golden Number for the Year, right against it in this Table is *Easter-Limit* that same Year; and the next *Sunday* following this Limit is *Easter-Day* in the *Julian* Account. So this Year 1734, the Golden Number is 6; against which is *April* 10, *Easter-Limit*; the next *Sunday* after is *April* 14, *Easter-Day*, &c.

In the above Discourse, where I have mentioned, that at the General Council they established the Rule for finding the Holy Feast of *Easter*; the *Full Moon* there mentioned is not the true time of the ☉ and ☽'s Opposition in an Astronomical Sense; but the Day only of the ☽'s mean Opposition, which is called the *Ecclesiastical Full Moon*, as is expressed in our Common Prayer-Book; according to which Rule I have framed this following Table, which, by the help of the Golden Number, and *Roman* Dominical Letter, gives the *Roman Easter*. In which Table, all those Days with no Name to them are in *April*.

A

A TABLE *to find the* Roman Easter.

G.N.	A	B	C	D	E	F	G
1	April 16	Apr. 17	Apr. 18	Apr. 19	Apr. 20	Apr. 14	Apr. 15
2	9	3	4	5	6	7	8
3	Mar. 26	Mar. 27	Mar. 28	Mar. 29	Mar. 30	Mar. 31	Mar. 25
4	April 16	Apr. 17	Apr. 11	Apr. 12	Apr. 13	Apr. 14	Apr. 15
5	2	3	4	5	6	Mar. 31	1
6	23	24	25	19	20	Apr. 21	22
7	9	10	11	12	13	14	15
8	2	3	Mar. 28	Mar. 29	Mar. 30	Mar. 31	1
9	16	17	Apr. 18	Apr. 19	Apr. 20	Apr. 21	22
10	9	10	11	12	6	7	8
11	Mar. 26	Mar. 27	Mar. 28	Mar. 29	Mar. 30	Mar. 31	1
12	April 16	17	Apr. 18	Apr. 19	Apr. 13	Apr. 14	15
13	2	3	4	5	6	7	8
14	Mar. 26	Mar. 27	Mar. 28	Mar. 22	Mar. 23	Mar. 24	Mar. 25
15	April 16	Apr. 10	Apr. 11	Apr. 12	Apr. 13	Apr. 14	15
16	2	3	4	5	6	7	1
17	23	Mar. 24	18	19	20	21	22
18	9	Apr. 10	11	12	13	7	8
19	2	Mar. 27	Mar. 28	Mar. 29	Mar. 30	Mar. 31	1

Note, $7 \times 19 = 133, \times 4 = 532$. That is, $4 \times 7 \times 19 = 532 = 19 \times 28 = 532$, the Revolution of *Easter* in both Accounts.

CHAP. XV.

To find by Calculation the Latitudes and Longitudes of all those Places on the Globe, where the principal Appearances of Solar Eclipses are seen.

TO give an Account of the chief *Phænomena* of a Solar Eclipse, and to describe the Places on the Earth, where they will happen, whilst the Shadow of the Moon goes along with the Earth,

Let H ⊖ B M represent the Globe of the Earth revolving from West to East by its Diurnal motion upon the Axis P ⊙ ⊖, P being the North Pole; but the South Pole lieth hid, being turned as much from ⊖ on the other side from us, as P is on this side towards us.

Keil's Lecture.

Let the Hemisphere of this Globe, seen in the Scheme, be that which is enlighten'd by the Sun; therefore the Sun will directly and perpendicularly shine on the Circle H ⊖ B M, whose Pole is ⊙.

And this may be truly proved, and represented by an artificial Globe, thus:

Mark the Sun's Place in the Ecliptic, and move the *Meridian* in the Horizon till the Sun's Place be in the Zenith. Here stay it.

Now all those Places that are above the Horizon are enlighten'd, and those under the Horizon are in Darkness.

The upperPart of the *Globe* is here represented by the *Circle* H⊖OB, which in Projections of this nature is called the *Horizon of the Eart's enlighten'd Disk*. And the Bigness of this Disk is to be estimated by the Angle under which the Earth is seen from the Moon, and is of the same Quantity with her Horizontal Parallax. And P ⊙ ⊖ is the Axis of the Globe. It is certain, that it is Noon at every Place of the Earth, when the Earth comes to that half of the Circle P ⊙ ⊖, which is here visible; because the Sun is in the Plane of it.

A I represents the Way of the Center of the *Moon*'s Penumbra, describing the Tract B *f* H, on the Surface of the Earth. Tho' the Hemisphere of the Earth, which is enlighten'd by the Sun, and consequently has Day, be supposed to be raised up above the Surface of the Scheme; yet the Way A I is conceived to be gone thro' by the Center of the Penumbra, on the Plane of the Disk, upon which the said Hemisphere stands.

Moreover, tho' P ☉ ⊖, L ☉ Q (the Ecliptic) and N e ☉, be Circles in the said enlighten'd Hemisphere, crossing one another in ☉, the Point directly under the Sun, they all represent the right Lines upon the Disk of the Earth, directly under these Circles, *viz.* those which are the Orthographical Projection of those Circles, when the Eye is supposed in a distant Point of the Right Line which joyns the Centers of the Earth and Sun.

It is plain, that when the Center of the *Moon*'s Penumbra is come to A (namely, when the penumbrous Circle touches the Earth's Disk at O) the Eclipse of the Sun will begin to an Inhabitant at O. Now he that is at O, by the Diurnal Revolution of the Earth begins to enter the enlighten'd Hemisphere; that is, the Sun rises to him.

Therefore to the Inhabitant of the Earth at O, whom, first of any Inhabitant of the Earth the Penumbra reaches, the rising Snn will first of all appear to be Eclipsed in its upper or Western Limb.

When the Center of the Penumbra it self comes to the Earth at B, an Inhabitant there sees the Rising Sun totally Eclipsed; because he is under the Center of the Penumbra; that is, if the Semidiameter of the *Moon* exceed that of the *Sun*: But if it doth not, it will be a Central Eclipse, and consequently Annular to him.

He that lives at C, sees the Sun Centrally Eclipsed in the Meridian.

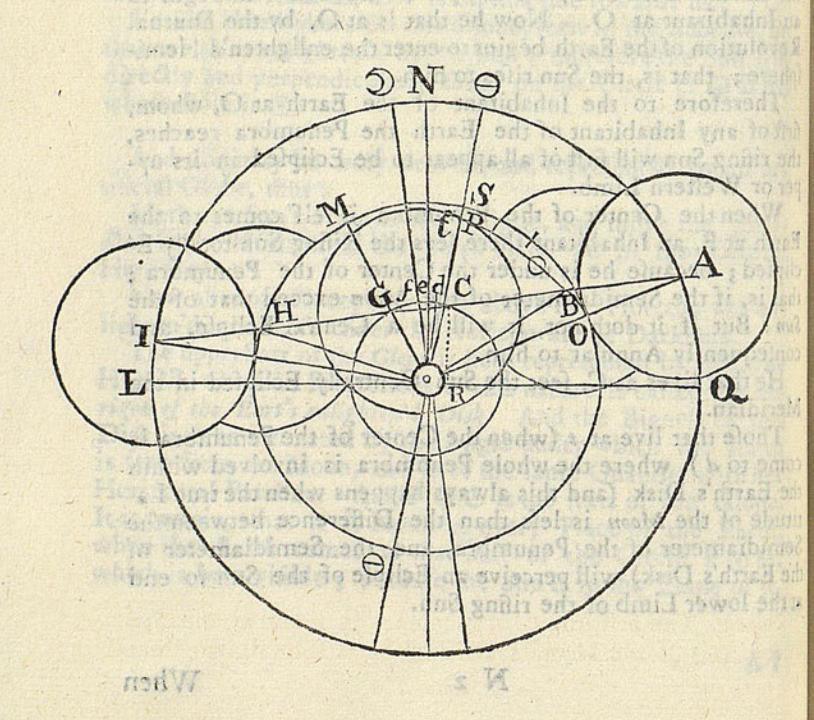
Those that live at *e* (when the Center of the Penumbra is come to *d*) where the whole Penumbra is involved within the Earth's Disk (and this always happens when the true Latitude of the *Moon* is less than the Difference between the Semidiameter of the Penumbra, and the Semidiameter of the Earth's Disk) will perceive an Eclipse of the Sun to end at the lower Limb of the rising Sun.

When the Center of the Penumbra comes to e, the Axis of the Ecliptic, the Sun will be Centrally Eclipsed in the the Nonagesime Degree; and *f*, the Axis of the *Moon's* Way, is the middle of the Universal Eclipse.

When the Center of the Penumbra comes to G, the Inhabitants of the Earth at M will perceive the Eclipse of the Sun to begin, as the Sun sets: For here the Penumbra doth last of all touch the Disk, as it is ready to go out of it.

And when the Penumbra is come to H, the End of the Disk, the Spectator, which at that time is at that Point, sees the setting Sun (because being ready to change Day for Night, he goes out of the enlighten'd into the darken'd Hemisphere) Centrally Eclipsed.

And *Lastly*, He that, being at I, receives the last stroke of the *Moon's* Penumbra, sees the setting Sun as it were contiguous to the *Moon* in its upper Limb, and the End of the Eclipse, both universal and particular every where.



In my *Compleat System of Astronomy*, I have shewed how to Calculate the Times and Quantities of a Solar Eclipse, both for any particular Place on the Globe, and also the time of the Ceneral Eclipse, shewing there the time the Penumbra takes up in in its Passage over the Earth's Disk; but the Latitudes and Longitudes where those Appearances happen, I have purposely omitted, then intending to give a particular Tract by it self; which I shall here do in the following manner.

And first of all, you must carefully observe these following Preliminaries.

First, By the 17th Precept of my *Compleat System of Astronomy*, you must Calculate the Times of the General Eclipse for the Meridian of *London*, and delineate the Scheme, to shew the Passage of the Penumbra over the Earth's Disk during the time of the proposed Eclipse, that so you may have all the Requisites in readiness, as you will have occasion for them in your following Work.

Secondly, If the true Latitude of the *Moon* at the equal Time of the true Conjunction be less than the Sum of the Semidiameter of the Earth's Disk and Penumbra, the Sun then will be Eclipsed somewhere on the Earth: But if it exceed the Semidiameter of the Earth's Disk, there will be but one Angle of Incidence, and the Eclipse will not be any where Total.

2. If the true Latitude of the *Moon* be less than the Semidiameter of the Earth's Disk, but more than the difference between the Semidiameters of the Earth's Disk and Penumbra, the Eclipse will then be Central, and there will be two Angles of Incidence.

3. If the true Latitude of the *Moon* be less than the difference between the Semidiameters of the Earth's Disk and Penumbra, there will be three Angles of Incidence, and the Eclipse will be Total, if the Diameter of the *Moon* exceed the Semidiameter of the *Sun*, otherways Annular.

Thirdly, The first Angle of Incidence is made at the *Sun* by the Axis of the *Moon's* Orb, and by a Line drawn from

thence to meet the *Moon's* Orb in the Center of the Penumbra when it cuts the Circumference of the Circle, that is, struck with the Sum of the Semidiameters of the Earth's Disk and Penumbra.

The second Angle of Incidence is made at the Sun, by the Axis of the Moon's Way or Orb, and by a Line drawn from the Sun to the Center of the Penumbra, when it cuts the Earth's Disk.

The third Angle of Incidence is made at the Sun, by the Axis of the Moon's Way, and by a Line drawn from the Sun to meet the Moon's Way in the Center of the Penumbra when it cuts the Perimeter of the Circle that is swept with the Difference of the Semidiameters of the Earth's Disk and Penumbra. And these are all the Varieties that can happen.

Fourthly, That the Angle Orient, or Altitude of the Nonagesime Degree in Projections for this purpose, is the Angle made by the Axis of the Ecliptic, and by a Line drawn from the Sun to any Point in the Earth's Disk, where the Center of the Penumbra touches it at any given time.

And this Angle may be found at all times, by adding or subtracting the Angle of the Moon's Way, to, or from the Angles of Incidences severally, as your own Reason will soon direct, better than a Multitude of Words: For if the Angle of the Moon's Way lie within the Angle of Incidence, then you must subtract; but if it lie without, you must add.

And by this Discovery which I have made in the *Keplerian* Method, you have not any occasion to find the Latitude of the *Moon*, except when the Center of the Penumbra is either in the Nonagesime Degree, or Centrally Eclipsed in the Meridian; and then make the Semidiameter of the Disk the Radius of a Line of Sines on the Sector; then will ☉ e in all the universal Schemes be the Co-Sine of the Altitude of the Nonagesime Degree or Angle Orient; and ☉ c the Co-Sines of the Angle Orient, when the Center of the Penumbra is upon the Earth's Axis; which two Analogies you will find in their proper places.

Fifthly, The Amplitude of the Path is always that Arch in the Horizon of the Disk between, where the Axis of the Globe cuts it, and where a Line drawn from the Sun to the Place where the Center of the Penumbra cuts it; which may be measured on the Chords, if you make the Semidiameter

meter of the Earth's Disk the Radius of the Chord of 60° upon the Sector. Where note,

Sixthly, If with the Altitude of the Nonagesime Degree, and the Cusp of the Ascendant, you enter the Table of the Angle Orient, where you find them to meet in the Table, is the Latitude of the Place North. But if you cannot find them throughout all the Table, then enter with the opposite Degree Ascending, and you will have the Latitude of the Place South. Except in the Polar Circles, where it is doubtful.

Seventhly, If the Time at *London* be less than it is at the Place sought, then the Place lies to the East of *London*; but if it be more at *London* than at the Place sought, then it lies to the West of the Meridian of *London*.

Eighthly, Observe in both methods for finding the Difference of Longitude, that you always subtract the Right Ascension of the *Medium Cœli* at *London* from the Right Ascension of the *Medium Cœli* at the Place you are seeking, and the Remainder is the Difference of Meridians in the *Keplerian* method. From the East, borrow a Circle, if you cannot subtract.

Also in the *Flamstedian* method, subtract the time of Sun-rising, &c. at *London*, from the time at the other Place, and the Remainder is the Difference of Meridians to the East of the Meridian of *London*; but if the Remainder exceed a Semicircle, or 180°, then deduct 180° from it, and the Remainder is the Longitude West of *London*.

To the Sun-rising always add 12 Hours, and to the time of Sun-setting borrow 24 Hours, if Subtraction cannot be made.

Ninthly, When you find the Latitude of the Place by the *Keplerian* method, the Angle Orient is found, as I have directed in the Fourth hereof, except when the Center of the Penumbra is upon the Earth's Axis; and then it must be done, as you will find in their proper Places.

But at any other time, if you would prove my Method of finding the Angle Orient, as shewn in the Fourth hereof; then when the Center of the Penumbra is at A or I, ⊙A = ⊙I must be made Radius, by saying,

As the Sum of the Semidiameter of the Earth's Disk and Penumbra = ⊙ A = ⊙ I,
Is to the Radius ;
So is the *Moon*'s Latitude,
To the Co Sine of the Angle Orient, or Altitude of the Nonagesime Degree.

When the Center of the Penumbra is at B or H, then ⊙ B = ⊙ H must be made Radius. And when the Center of the Penumbra is at *d* or G (in Figure 1.) then ⊙ *d* = ⊙ G must be made Radius ; that is,

As the Difference between the Semidiameter of the Penumbra and Earth's Disk,
Is to the Radius ;
So is the *Moon's* Latitude at *d* or G,
To the Co Sine of the Angle Orient at that Place.

Example. In the Sun's Eclipse, *July* the 4*th*, 1730, in the Scheme, Page 180, the *Angle e* ⊙ *d* = 3° 29′ = *Angle* Orient ; then suppose a Perpendicular let fall from *d*, and it will be parallel to ⊙ *e* ; therefore the Angle formed thereby at *d* = to the Angle *e* ⊙ *d* 3° 29′, and the Side ⊙ *d* is known to be = to the Difference between the Semidiameter of the Earth's Disk and Penumbra 23′ 7″.

Now, for the *Moon*'s Latitude when at *d*, say,

	° ′	
As Radius	90 00	10.000000
To ⊙ *d*	1387	3.142076
So C.S. ∠ at *d*	3 29	9.999197
To Lat. ☽	1384	3.141273 = 23′ 4″.

Then for the Angle Orient,

As Semidiameter X = ⊙ *d*	1387″	3.141076
To Radius —	90′ 00″	10.000000
So ☽ Lat. at *d*	1384	3.141136
To C.S. ∠ Orient	3 29	9 999060

Lastly, In the *Keplerian* Method, the Latitude of the Place is known to be North or South, by the Table of the Angle Orient, as directed in the Sixth hereof : But when the Latitude falls within the Polar Circles, it is doubtful.

But

But in the *Flamsteedian* Method, the Place is known to be in North or South Latitude by that of the Amplitude of the Path.

For if the Amplitude of the Path, be less than 90°, the Latitude of the Place is of the same Name with the *Moon*'s Latitude; but if more than 90°, 'tis of a contrary Name.

If the Latitude of the *Moon* exceed the Semidiameter of the Earth's Disk, the *Sun* will not be then Centrally Eclipsed, neither on the Meridian, nor in the Nonagesime Degree. Witness the Sun's Eclipse, *June* 11, 1732.

Tenthly, These things being well understood; and also supposing the Reader to be well acquainted with my *Compleat System of Astronomy*, he may now proceed to the matter in hand: And for an Example, I shall now begin with the Eclipse of the Sun that happen'd the 4th Day of *July* 1730, under the Meridian of *London*, from my Tables of Sir *Isaac Newton*'s *Theory of the Moon*.

The

The Time of the the true *Conjunction* of the *Sun* and *Moon*, according to the Tables in my *Satellite Astronomy*, ſtands thus:

Eq.Time tr. ☌.	Longit. ☉. s ° ' "	Anom. ☉. S. ° ' "	*Hourly Mot. of* ' "
Anno 1730	9 20 42 12	6 12 27 14	☽ 29 43
July 3	6 01 21 32	6 1 21 1	☉ 2 22
Hours 16	39 25	39 25	☽ à ☉ 27 21
Minutes 59	2 25	2 25	
Seconds 40	2	2	
Mean Motion	3 22 45 36	0 14 30 7	
Equation ſub.	0 28 33		
Sun's tru.Place	3 22 17 03		

Eq.Time tr. ☌	Longit. ☽.	Apog. ☽.	Node ☽.
Anno 1730	6 19 42 42	2 18 21 10	10 6 29 16
July 3	8 24 27 24	20 29 57	9 44 37
Hours 16	8 47 03	4 27	2 7
Minutes 59	32 24	16	8
Seconds 40	22	3 8 55 50	— 9 46 52
Mean Motion	3 23 29 55	— 4 54	9 26 42 24
1 Equat. add	2 52	3 8 50 56	+ 2 20
Moon Equated	3 23 29 55	3☉22 17 3	9—26 44 44
2 Equat. ſub.	1 37	0 13 26 7	3☉22 17 3
Moon Equated	3 23 31 10	0 26 52 14	5 25 32 19
3 Equat. ſub.	7	+ 4 37 38	10 21 4 38
Moon Equated	3 23 31 03	3 13 28 34	— 0 13 33
4 Equat. ſub.	1 14 00	3☽23 31 3	9 26 31 11
☽ in her Orb	3 22 17 03	0 10 2 29	
Node ſub.	9 26 31 11	0½=5 1 14½	
Arg. Lat.	5 25 45 52	Eccentricity--	—— 65727
Tr.Lt. ☽ N.D.	22 49	Mean Anom.	0 10 2 29
Reduct. add	1 4	Inclin.of Lim	-it 17 41
Ecliptic Place	3 22 18 7	Simple Latit.	—— 21 44
		Increment —	1 5

' "		' "
As H.Mot. ☽à☉ 27 21 LL 3412	Exceſs	0 7
To 1 *Hour, or* 60 0 0	Proportional Part add	1 5
So Reduc. add 1 4 17501	True Latitude N.D.	22 49
To Time Red. ſub. 2 21 14099		

The Requisites being found according to that Book, must be set down thus :

	d.	h.	′	″
Equal Time true ☌ at *London* 1730, *July*	3	16	59	40
Equation of Time sub. —			5	16
Apparent Time in the Moon's Orb	3	16	54	24
Time of Reduction sub. and add			2	21
Apparent Time of the { Ecliptic Conjunction		16	52	3
Middle —		16	56	45
True Latitude of the Moon N. D.			22	49
Diff. Horiz. Parallax of ⊙ and ☽ = Semid. ⊕'s Disk			53	49
Semidiameter of the Sun — —			15	51
Semidiameter of the Moon — —			14	51
Sum is Semid. of the Penumbra, add and sub.			30	42
Sum of the Semid. of the Earth's Disk and Penumb.			84	31
Difference — — —			23	7

Here the Sum being more than the Moon's Latitude, proves an Eclipse ; and the Difference being more than the Moon's Latitude, proves, the Penumbra will all fall within the Earth's Disk, and that there are three Angles of Incidence.

	°	′	″
Angle of ☽'s Orb with the Ecliptic = *e* ⊙ *f*	5	45	0
Sun's Declination North	21	38	0
Inclin. Axis Earth, and Axis Ecliptic = ∠ *e* ⊙ *c*	9	22	0
First ∠ of Incidence = *f* ⊙ A = *f* ⊙ I	74	20	0
Motion of half Duration = A *f* = *f* I — 4883″		81	23
Time of half Duration sub. and add	2	58	38
Second ∠ of Incidence = *f* ⊙ B = *f* ⊙ H	64	55	0
Motion of half Duration of Centr. Ecl. = B*f* = *f* H		48	44
Time of half Duration Centr. Eclipse sub. and add	1	46	56
Third ∠ of Incidence = *f* ⊙ *d* − *f* ⊙ G	9	14	0
Motion from *d* to *f* = 223″		3	43
The Time sub. and add —		8	9
Angle of Direction = ∠ *f* ⊙ C	15	7	0
Distance in the Earth's *Axis* = ⊙ C 1418″		23	38
Motion from C to *f* 370		6	10
Time the Penumbra is passing from C to *f* sub.		13	32
Dist. of Center of Penumbra in *Axis* of Ecl. = ⊙ *e* 1376″		22	56
Motion from *e* to *f* 109″		1	49
Time the Penumbra is moving from *e* to *f* sub.		3	59

Now,

Now, by *Precept* 17, *Page* 411, of my *Compleat System of Astronomy*, project the Diagram as in Page 180.

The outermost Circle is drawn with the Sum of the Disk and Penumbra; the next, with the Semidiameter of the *Earth*'s Disk; and the innermost, with the Difference of the *Penumbra* and Disk, all upon the Center ⊙.

Note, The Elevation of the Pole above the Plane of the Disk is always equal to the Declination of the Sun.

This you may prove by a Globe: For, bring the Sun's Place into the Zenith, and then the enlighten'd Pole will be just so much elevated as is the Sun's Declination.

Now, according to the Doctrine of my fore-cited Book, I have found at *London*, when the

	D.	h.	′	″
Eclipse first begins at Sun-rising L 1730, *July*	3	13	58	07
Central Eclipse begins at B		15	9	49
Meridional Sun Centrally Eclipsed C		16	43	13
Eclipse ends at Sun-rising *t*		16	48	36
Nonagesime Sun Centrally Eclipsed e		16	52	3
Middle of the Eclipse *f*		16	56	45
Eclipse begins at Sun-setting M		17	4	54
Central Eclipse ends H at Sun-setting		18	43	41
End of the Eclipse at O Sun-setting		19	55	23
After the Penumbra has continu'd in passing over the Earth,		5	57	16

1. To find the Place O on the Globe, where the Sun is seen to begin to be Eclipsed at his Rising: The Center of the Penumbra is then at A.

1. By the *Keplerian* Method.

OPE-

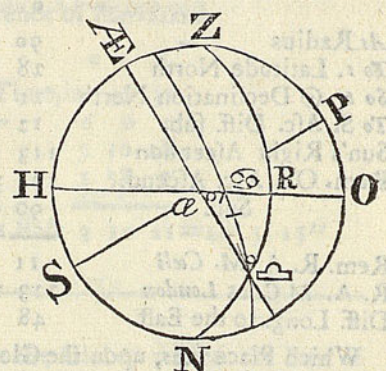
OPERATION.

	D.	h.	′	″
Apparent Time at *London* when the Penumbra first touches the Disk,	3	13	58	7
Equation of Time add — —			5	16
Equal Time — —	3	14	3	23
Sun's Place then by my Tables	♋ 22		10	3
Sun's Right Ascension —	113		57	0
Apparent Time from Noon add	209		31	45
Sum, is the Right Ascension Mid-Heaven	323		28	45
Sun's Declination North	21		39	0

For the Angle Orient.

First Angle of Incidence = L ⊙ *f*	74	20	0
Angle of the *Moon*'s Way = *f* ⊙ e sub.	5	45	0
Remains Angle Orient = L ⊙ e	68	35	0

Enter the Table at the End hereof with the Sun's Place ♋ 22° 10′ 3″; for it is the Cusp of the Ascendant; and seek in the same Line you find the Altitude of the Nonagesime Degree, which is the same with the Angle Orient 68° 35′, and it will give the Latitude of the Place North 28° 22′: Or, by Trigonometrical Calculation, in the adjacent Diagram, Æœ ♎, is the Equinoctial, ♋ ♎, a Part of the Ecliptic, R ♎ is a Perpendicular let fall upon the Angular Point, and cutting the Horizon at Right Angles;



As

	° ′	
As *C.t.* ∠ ♎ ♋ R Orient	68 35	9.593542
To Radius	90 00	10.000000
So *C.S.* ♋ ♎ Longitude	67 50	9.576689
To *C. t.* ∠ ♋ ♎ R	46 7	9.983147
Add ∠ œ ♎ ♋	23 29	
Z = ∠ œ ♎ R	69 36	
As S. ∠ ♋ ♎ R	46 7 Co Ar.	0.142214
To S. ∠ œ ♎ R	69 36	9.971871
So *C. S.* ∠ ♎ ♋ R ∠ Orient	68 35	9.562468
To S. Lat. North	28 22	9.676553

Note, This last Analogy gives the Co Sine of the Angle ♎ œ R, which is the Elevation of the Equator. Therefore because the Co Sine of the Co Sine is equal to the Sine, I shall in the following Work always say, To the Sine of the Latitude.

For the Difference of Longitude.

	° ′	
As Radius	90 00	10.000000
To t. Latitude North	28 22	9.732351
So t. ☉ Declination North	21 39	9.598722
To S. Asc. Diff. sub.	12 23	9.331073
Sun's Right Ascension	113 57	
Rem. Ob. Asc. Ascend.	101 34	
Sub.	90 00	
Rem. R. A. M. *Cœli*	11 34 00″ + 360°	
R. A. M.C. at *London*	323 28 45	
Diff. Long. to the East	48 5 15 of *London.*	

Which Place falls, upon the Globe, near the West End of the *Persian* Gulf.

2. By the *Flamsteedian* Method.

OPE-

OPERATION.

First Angle of Incidence L ☉ *f*	74° 20′	
Angle of Direction *f* ☉ C sub.	15 7	
Amplitude of the Path C ☉ L	59 13	

	° ′	
As Radius — —	90 00	10.000000
To C.S. Sun's Declin. North	21 39	9.968228
So C.S. Amplitude of the Path	59 13	9.709094
To S. Latit. of the Place North	28 24	9.677322

Fig. I. *Note*, Draw the *Arch* of the Great Circle PO, and you will have the Right-angled Spheric Triangle PSO, in which are given SO, the Amplitude of the Path 59° 13′, the Sun's Declination (for P ☉ is the Sun's Distance from the Pole) to find P O, the Complement of the Latitude; and therefore because a Co Sine falls upon a Co Sine, in all the following Work I always say, To the Sine of the Latitude of the Place.

For the Difference of *Meridians*.

	° ′ ″
Asc.Diff. 12° 23′ reduc'd into Time, is	49 32
From — —	6 0 0
True Time of Sun-rising	5 10 28
Time then at *London* sub.	1 58 7
Rem. Difference of Meridians East	3 12 21 = 48° 5′ 15″

---

2. To find the Place B on the Globe, where the Sun is Centrally Eclipsed.

1. By the *Keplerian* Method.

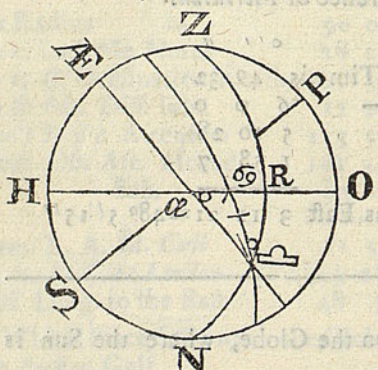
OPERATION.

	D.	h.	′	″
Apparent Time at *London* when the Central Eclipse begins	3	15	9	49
Equation of Time add			5	16
Equal Time — —	3	15	15	5
Sun's true Place — —	♋	22	12	29
Sun's Right Ascension —		113	59	0
Apparent Time from Noon add		227	27	15
Sum is the Right Asceosion *Med. Cœli*		341	26	15
Sun's Declination North		21	39	0

For the *Angle* Orient.

	°	′
Second *Angle* of Incidence = *f* ☉ B	64	55
Angle of the *Moon*'s Way *f* ☉ e sub.	5	45
Rem. the *Angle* Orient	59	10

With this, and the Sun's Place in the Ascendant, ♋ 22 Degrees, 12 Minutes, 29 Seconds. Enter the Table of the Angle Orient, and where you find them both to meet, will on the Head of the Table be the Latitude of the Place North 36 Degrees, 50 Minutes.



Or,

Or, by Calculation,

	° ′	
As C.t. ∠ ♎ ♋ R ∠ Orient	59 10	9.775908
To Radius —	90 00	10.000000
So C.S. ♋ ♎ —	67 48	9.577309
To C.t. ♋ ♎ R	57 40	9.801401
Add ∠ œ ♎ ♋	23 29	
Z = ∠ œ ♎ R	81 9	

As S. ∠ ♋ ♎ R	57 40	Co Ar. 0.073169
To S. ∠ œ ♎ R	81 9	9.994798
So C.S. ∠ ♎ ♋ R	59 10	9.709730
To S. Latitude North	36 50	9.777697

For the Difference of Longitude.

	° ′	
As Radius	90 00	10.000000
To t. of Latit. North	36 50	9.874481
So t. ☉ Declin. North	21 39	9.598722
To S. Asc. Diff.	17 18	9.473203
Sun's R. Ascension	113 59	
Rem. Ob. Asc. Ascend.	96 41	
Sub.	90 0	
Rem. R.A. M.C.	6 41 0″ + 360°	
Ri. A. *M.C.* at *London*	341 26 15 sub.	
Diff. Longit. East	25 14 45 of *London.*	

2. By the *Flamsteedian* Method.

OPERATION.

	° ′
Second Angle of Incidence = f ☉ B	64 55
Angle of Direction = f ☉ C sub.	15 7
Rem. Amplitude of the Path = ∠ S ☉ B	49 48

Now, if from P you draw a great Circle to B, that it be the Distance of the Zenith of the Place from the Pole ; and to find it, you have given as before,

Then say,

		°	′	
As Radius	-- - ---	90	00	10.000000
To *Co S.* ☉ Declination		21	39	9.968228
So *Co S.* Amplitude of the Path	—	49	48	9.809868
To S. Latitude of the Place North		36	52	9.778096

For the Difference of Meridians.

	h.	′	″	
Ascensional Diff. 17° 18′ reduc'd into Time is	1	9	12	sub.
From — —	6	0	0	
True Time Sun-rising is	4	50	48	
Time then at *London* sub.	3	9	49	
Difference of Meridians East	1	40	59	

Which reduc'd into Degrees, are 25° 14′ 45″, as before. Which Place falls on the Globe near the Eastern *Coast* of the Isle of *Candia* in the Mediterranean Sea.

---

3. To find the Place *C* on the Globe, where the Sun is *Centrally* Eclipsed in the Meridian.

1. By the *Keplerian* Method.

OPERATION.

	d.	h.	′	″
Apparent Time at *London* 1730, *July*	3	16	43	13
Equation of Time add —			5	16
Equal Time — —	3	16	48	29
Sun's Place then —	♋	22	16	36
Sun's Right Ascension ——		114	5	0
Apparent Time from Noon add		250	48	15
Sum is the R.A. *M. Cœli* at *London*		4	53	15
Sun's Declination North		21	38	0

Now, before we can find the Latitude of the Place, we must find the nearest Distance of the Center of the Penumbra

bra on the Axis of the Globe to the Ecliptic, which is the same with the Moon's Latitude then, = R C.

Therefore in Figure 1, let fall the Perpendicular *c* R; and because it is parallel to *e* ☉, the Angle ☉ *c* R is known to be equal to the Angle *e* ☉ *c*, the Inclination of the two *Axes* 9° 22′, and the Distance in the *Axis* of the Globe ☉ *c* is known 1418″, to find *c* R the Moon's Latitude.

	° ′	
As Radius —	90 00	10.000000
To the Distance in the *Axis* = ☉ *c*	1418	3.151676
So C.S. ∠ ☉ *c* R	9 22	9.994171
To *c* R, the Moon's Latitude	1399	3,145847

Now for the Altitude of the Nonagesime Degree.

As Semidiameter of *Earth*'s Disk = ☉ B	3229	3.509068
To Radius — —	90° 00′	10.000000
So Moon's Latitude = *c* R	1399	3.145847
To C.S. Altit. Nonagesime Degree	64 19	9.636779

Make ☉ R the Radius of a Line of Sines on the Sector, and take *c* R in your Compasses, and apply it to the Line of Sines, shall give the Sine-Complement of the Angle Orient, or Altitude of the Nonagesime Degree, which in this case is 25° 41′, whose Complement is 64° 19′, the Altitude of the Nonagesime Degree sought, and is the same with the Calculation.

Now, you are to observe, that the Place of the Sun at the given time, is also the Cusp of the *Medium Cœli*; because he is now upon the Meridian of the enquired Place: Therefore his *Right Ascension* 114° 5′, is also the *Right Ascension* of the Mid Heaven: To which we must find the Meridian *Angle*, by the 29th *Problem* of my *Compleat System of Astronomy*, and by *Problem* 33, the Distance of the Sun, or Mid Heaven (which is all one) from the Nonagesime Degree.

Then having found the Nonagesime Degree, add 3 Signs to it, and you will have the Cusp of the Ascendant at the place sought. See all the Work in its Order, as follows.

For the *Meridian Angle* say,

	° ′	
As Radius — —	90 00	10.000000
To S. Obliquity of the Ecliptic	23 29	9.600409
So C.S. *M.C.* = ⊙ R. A.	65 55	9.610729
To C.S. *Meridian Angle*	80 39	9.211138

For Dist. Mid-Heaven from Nonagesime Degree.

As Radius — —	90 00	10.000000
To C.t. Altit. Nonges. Degree	64 19	9.682063
So C.t. Meridian Angle	80 39	9.216568
To S. Dist. *M.C.* à Nonag. Degr.	4 33	8.898631

Now *note*, If the Sun be in { ♋ ♌ ♍ ♎ ♏ ♐ sub. / ♑ ♒ ♓ ♈ ♉ ♊ add

This Distance thus found to, or from, the Sun's Place, gives the Nonagesime Degree at the Place required.

OPERATION.

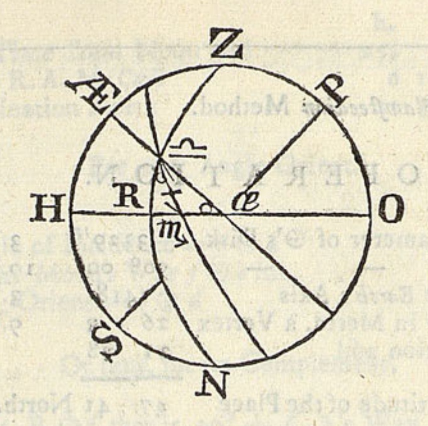
	° ′ ″
Sun in the Mid-Heaven	♋ 22 16 36
Dist. of it from the Nonagesime Degr. sub.	4 33 00
Nonagesime Degree	3 17 43 36
Add ---- ----	3 00 00 00
Cusp of the *Ascendant* at the Place sought	6 17 43 36

Now, for the Latitude of that Place.

	° ′	
As C.t. ∠ R ♏ ♎ ∠ Orient	64 19	9.682063
To Radius	90 00	10.000000
So C.S. ♎ ♏	17 44	9.978858
To C.t. ∠ R ♎ ♏	26 48	10.296795

	° ′
Angle R ♎ ♏	26 48
Angle ♏ ♎ œ ♁	23 29
Angle R ♎ œ	50 17

As



	° ′		
As S ∠ R ♎ ♏	26 48	Co Ar.	0.345941
To S. ∠ R ♎ œ	50 17		9.886047
So C. S. ∠ R ♏ ♎	64 19		9.636886
To S. Latitude North	47 40		9.868874

But if the Latitude of the Place be South, and the Sun

in { ♋ ♌ ♍ ♎ ♏ ♐ add / ♑ ♒ ♓ ♈ ♉ ♊ sub. } the Distance of the Sun in the Meridian, from the Nonagesime Degree, to, or from the Sun's Place, gives the Place of the Nonagesime Degree.

For the Longitude of that Place.

	° ′ ″	
R.A. *M.C.*	114 5 0	= to the Sun's R. A.
Right Asc. *M.C.*	4 53 15	at *London*.
Diff. Longit.	109 11 45	to the East of *London*.

2. By the *Flamsteedian* Method.

OPERATION.

As the Semidiameter of ⊖'s Disk	3229″	3.509068
To Radius — —	90° 00′	10.000000
So Dist. in the *Earth*'s Axis	1418	3.151697
To S. Dist. ☉ in Merid. à Vertex	26 3	9.642629
Sun's Declination add	21 38	
Sum is the Latitude of the Place	47 41 North.	

For the Difference of Meridians.

	h.	′	″
The Time is there Noon =	24	00	00
Time at *London* sub.	16	43	13
Difference of Meridians	7	16	47

Which reduced, is 109° 11′ 45″ to the East of *London*. This Place falls on the Globe in *Great Tartary*.

4. To find the Place *d* on the Globe; that is, where the Center of the *Penumbra* is, when those that live at *t*, see the Eclipse end at Sun-rising.

1. By the *Keplerian* Method.

OPERATION.

	d.	h.	′	″
Apparent Time at *London, July*	3	16	48	36
Equation of Time add			5	16
Equal Time —		16	53	52
Sun's Place then by my Tables	♋	22	16	50
Sun's Right Ascension		114	5	00

Apparent

	h.	°	′
Apparent Time from Noon add	252	9	00
Sun, is the R. A. M. *Cœli*	6	14	00
Sun's Declination North	21	38	00

For the Angle Orient.

	°	′
Third Angle of Incidence = *f* ☉ *d*	0	14
Angle of the Moon's Way *f* ☉ *e* sub.	5	45
Remains ∠ Orient = *e* ☉ *d*	3	59

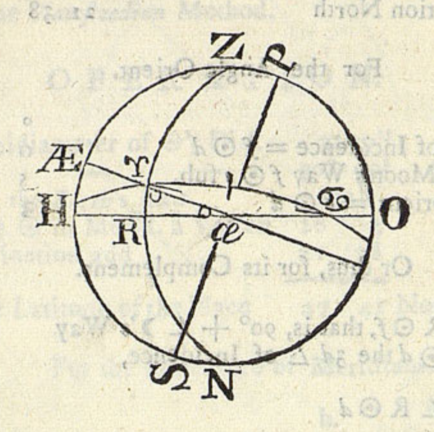
Or thus, for its Complement.

From the ∠ R ☉*f*, that is, 90° + ∠ ☽'s Way,	95	45
Sub. the ∠ *f* ☉ *d* the 3*d* ∠ of Incidence,	9	14
Remains the ∠ R ☉ *d*	86	31

Now, with the Sun's Place *Cancer* 22° 16′ 50″, being the Cusp of the Ascendant, and the Angle Orient 3° 29′ enter the following Tables: But because they cannot be found to answer therein, is a proof that the Latitude of the Place is within the Artic Circle.

Or, by Trigonometrical Calculation.

OPERATION. A doubtful Case.



	° '	
As C.t. ∠ R ♋ ♈ ∠ Orient	3 29	11.215592
To Radius	90 00	10.000000
So C.S. ♈ ♋ Longitude	67 43	9.578853
To C.t. ∠ R ♈ ♋ sub.	88 41	8.363261
From	180 00	
∠ R ♈ ♋	91 19	
Sub. ∠ œ ♈ ♋	23 29	
= ∠ R ♈ œ	67 50	

As S. R. ♈ ♋	88 41 Co Ar.	0.000115
To S. ∠ R, ♈ œ	67 50	9.966653
So C.S. ∠ R ♋ ♈ ∠ Orient	3 29	9.999197
To S. Lat. North	67 37	9.965965

Now say,

	° '	
As Radius	90 00	10.000000
To t. Lat. North	67 37	10.385282
So t. ☉ Decl. North	21 38	9.598354
To S. A. Differ.	74 22	9.983636

For the Difference of Longitude.

	°	′	
Sun's Right Aſcenſion	114	5	
Aſcen. Difference ſub.	74	22	
X Ob. *Aſcen. Aſcendant*	39	43	+ 360° = 399° 43′
Sub.	90	00	
Rem. ℞ *A. M.C.*	309	43	
℞ *A. M. Cæli* at *London* ſub.	6	14	
Diff. Longit. Eaſt of *London*	303	29	Weſt 56° 31′

2. By the *Flamſteedian* Method.

OPERATION.

	°	′	
Angle of Direction = *f* ⊙ *c*	15	7	
Third Angle of Incidence = *f* ⊙ *d*	9	14	ſub.
Amplitude of the Path = *t s*	5	53	

As Radius —	90	00	10.000000
To C.S. Sun's Declination	21	38	9.968278
So C.S. Amplitude of the Path	5	53	9.997706
To S. Latitude North	67	37	9.965984

For the Difference of Meridians.

	h	′	″	
Aſc. Diff. 74° 22′ in Time is	4	57	28	ſub.
From —	6	00	00	
Sun riſes at	13	2	32	+ 24 hours.
Time at *London*	16	48	36	
Rem. Diff. Meridians Eaſt	20	13	56	

Which reduced into Degrees, are 303° 29′: Which Place falls on the Globe in the unknown North Sea beyond *Hudſon's Bay*. This is the moſt Weſterly of all where the Eclipſe is ſeen.

5. To

5. To find the place *e* on the Globe where the Sun is Centrally Eclipsed in the Nonagesime Degree,

1. By the *Keplerian* Method.

OPERATION.

	d.	°	′	″
Apparent Time at *London*, 1730, *July*	3	16	52	3
Equation of Time add			5	16
Equal Time —	3	16	57	19
Sun's place then =	♋	22	16	57
Sun's *Right Ascension* =		114	5	0
Apparent Time from Noon add		253	0	45
Sum is the *R. A. M. Cœli* at *London*		7	5	45
Sun's Declination North		21	38	0
☽'s Lat. = Dist. in *Axis* Ecl. ☉*e* nearly 1376″			22	56

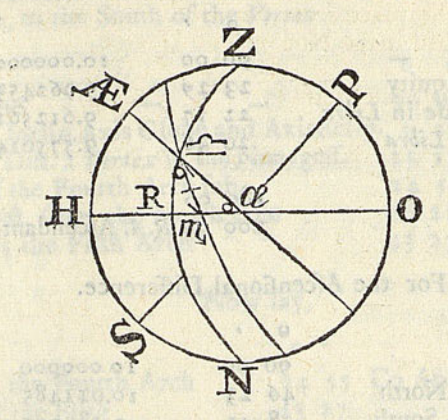
Now say,

As the Semid. of ⊖'s Disk	3229″			3.509068
To Radius ----	90°	00′		10.000000
So Moon's Lat. = ☉ *e*	1376			3.138618
To C.S. Alt. Nonagef. Degr.	64	47		9.629550
Sun's Place = Alt.Nonag.	3s. 22	16	57″	
Add	3 00	00	00	
Sum, is Cusp of Ascend.	6 22	16	57	

With this Ascendant *Libra* 22° 16′ 57″, and the Angle Orient enter the Table following, and they will give the Latitude of the place North 46° 25′.

Or,

Or, by Calculation.



	°	′	
As C.t. ∠ R ♏ ♎ Orient	64	47	9.672947
To Radius	90	00	10.000000
So C.S. ♎ ♏ Longitude	22	17	9.966292
To C.t. ∟ R ♎ ♏	26	58	10.293345
Add ∟ R ♏ ♎ œ	23	29	
Z ∟ R ♎ œ	50	27	

	°	′		
As *S.* ∟ R œ ♎	26	58	Co Ar.	0.343449
To *S.* ∟ R ♎ ♍	50	27		9.887093
So *C.S.* ∟ R ♏ ♎	64	47		9.629453
To S. Latitude Nor.	46	25		9.859995

Now you must find the Declination of the Cusp of the Ascendant.

	°	′	
As Radius —	90	00	10.000000
To *S.* Obliquity	23	29	9.600409
So *S.* Longitude in *Libra*	22	17	9.578853
To *S.* Declination South	8	41	9.179262

For

For the Right Aſcenſion of the Aſcendant.

	° ′	
As Radius —	90 00	10.000000
To *C. S.* Obliquity	23 29	9.962453
So t. Longitude in *Libra*	22 17	9.612561
To *t.* R. A. à *Libra*	20 36	9.575014
	180 00	
	200 36 *R.A.* Aſcendant.	

For the Aſcenſional Difference.

	° ′	
As Radius	90 00	10.000000
To *t.* Latitude North	46 25	10.021485
So *t.* Declinat. South	8 41	9.183907
To S. Aſcen. Diff.	9 14	9.205392
R.A. of Aſcend. add	200 36	
Z Obl. Aſc. Aſcendant	209 50	
Sub.	90 00	
R.Aſc. *Med. Cœli*	119 50	
R. Aſcen. at *London*	7 5 45″	
Diff. Long. Eaſt of *London*	112 44 15	

2. By the *Flamſteedian* Method.

The Fourth *Arch* muſt be taken from the Sun's Diſtance from the ſame Pole that the Moon is next unto; *i. e.* If the Moon hath North Latitude, take it from the Sun's Diſtance from the North Pole: If the Moon hath South Latitude, take it from the Sun's Diſtance from the South Pole; and the Remainder is the Fifth *Arch*.

OPERATION.

As Semid. of the Earth's Disk	3229″	3.509068
To Radius —	90 00	10.000000
So Diſt. ☉ *e* in *Axis* of Ecliptic	1376	3.138618
To S. Azim. between ☉ & *Vertex*	25 13	9.629550

Its Compl. 64° 47′ is the Altit. Nonageſ.

Note,

Note, If the Distance of ☉ from the *Vertex* be less than the ☉'s Declination North, then the ☉ is to the North; otherwise, to the South of the *Vertex*.

	° ′	
As Radius — —	90 00	10.000000
To *C.S.* Inclin. Axis Globe and Axis Eclip.	9 22	9.994171
So *t.* ☉ Dist. à *Vertex* in the Nonagess.	25 13	9.672947
To *t.* of the Fourth Arch sub.	24 55	9.667118
Sun's Dist. from the North Pole	68 22	
Remains the Fifth Arch	43 27	

Now say,

	° ′		
As *C. S.* the Fourth Arch	24 55	Co Ar.	0.042429
To *C. S* the Fifth	43 27		9.860921
So *C.S.* ☉ Dist. a *Vertex*	25 13		9.936506
To *S.* Lat. North	46 24		9.859856

For the Difference of *Meridians.*

	° ′		
As *S.* Fifth Arch —	43 27	Co Ar.	0.162588
To *S.* the Fourth	24 55		9.624591
So *t.* Inclin. of the two *Axes*	9 22		9.217356
To *t.* Hour à *Noon* when ☉ in *Nonag.*	5 46		9.004535

Given Time is 6 h. 52′ 3″, Complement = 7 h. 7′ 57″, reduced into Degrees, are 106° 59′ 15″; added to the Hour from Noon in the Nonagesime Degree 5° 46′, makes 112° 45′ 05″; which is the Difference of Longitude to the East of *London*; which Place falls on the Globe in *Great Tartary.*

6. To

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6. To find the Place M on the Globe, where the Eclipse is seen to begin at Sun-setting, and the Center of the Penumbra is then at G.

1. By the *Keplerian* Method.

OPERATION.

	d.	h.	′	″
Apparent Time at *London*, 1730, *July*	3	17	4	54
Equation of Time add			5	16
Equal Time — —	3	17	10	10
Sun's Place then	♋	22	17	28
Sun's Right Ascension —		114	6	0
Apparent Time from Noon add		256	13	30
Sum is the R. *A. M. Cæli* at *London*		10	19	30
Sun's Declination North		21	38	0

For the Angle Orient.

	°	′
Third Angle of Incidence *f* ⊙ G	9	14
Angle of the Moon's Way add *f* ⊙ *e*	5	45
Z, is the Angle Orient = G ⊙ *e*	14	59

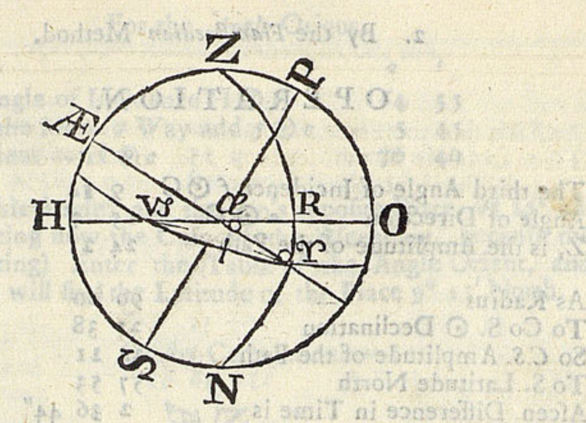
Sun's Place and Setting is ♋ 22° 17′ 28″; therefore the Ascendant is ♑ 22° 17′ 28″.

Enter the Table of the Angle Orient with 14° 59′, and the Ascendant ♑ 22° 17′ 28″, and they will give the Latitude of the Place North 57° 53′

Or, by Calculation.

	°	′	
As *C.t.* ∠ œ ♑ ♈ ∠ Orient	14	59	10.572453
To Radius —	90	00	10.000000
So *C.S.* ♑ ♈ Longitude	67	43	9.578853
To *C.t.* ∠ ♑ ♈ R	84	12	9.006400
Sub. ∠ ♑ ♈ œ Obliquity	23	29	
Remains the ∠ œ ♈ R	60	43	

As



	° ′	
As S. ∠ ♑ ♈ R	84 12	Co Ar. 0.002229
To S. ∠ œ ♑ ♈ R	60 43	9.940622
So C.S. ∠ œ ♑ ♈	14 59	9.984977
To S. Latitude North	57 53	9.927828

For the Difference of Longitude.

	° ′		
As Radius —	90 00		10.000000
To *t*. Latitude North	57 53		10.202245
So *t*. ☉ Declin. North	21 38		9.598354
To *S*. A. Difference	39 11		9.800599
Sun's Right Ascension add	114 6		
Obl. Desc, Descend.	153 17		
Add	90 0		
R. A. *M. Cæli*	243 17	0″	
R. A. *M. Cæli* at *London*	10 19	30	
Diff. Longit. East	232 57	30 from *London*	

2. By

2. By the *Flamsteedian* Method.

OPERATION.

	°	′		
The third Angle of Incidence *f* ☉ G	9	14		
Angle of Direction *e* ☉ C	15	7		
Z, is the Amplitude of the Path	24	21		
As Radius —	90	00		10.000000
To Co S. ☉ Declination	21	38		9.968278
So *C.S.* Amplitude of the Path	24	21		9.959539
To S. Latitude North	57	53		9.927817
Ascen. Difference in Time is	2	36	44″	
Add — —	6	0	0	
Time of Sun-setting	8	36	44 + 24 Hours.	
Time at *London* —	17	4	54	
Difference of Meridians	15	31	10	

Which reduced into *Degrees* and *Minutes*, are 232° 57′ 30″ to the East of *London*, as before.

This is the most Easterly of all where the Eclipse was seen.

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7. To find the Place on the Globe, where the Sun is Centrally Eclipsed at his Setting; the Center of the Penumbra is then at H.

1 by the *Keplerian* Method.

OPERATION.

	D.	h.	′	″
Apparent Time at *London* 1730, *July*	3	18	43	41
Equation of Time add —			5	16
Equal Time —	3	18	48	57
Sun's Place —	♋	22	21	24
Sun's Right Ascension —		114	9	0
Apparent Time from Noon add		280	55	15
Sum, is the *Right Ascension M. Cœli* at *London*		35	4	15
Sun's *Declination* North		21	38	0

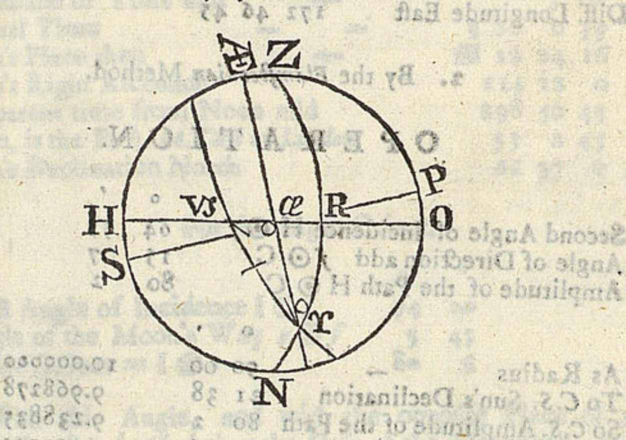
For

For the *Angle* Orient.

	°	′
Second Angle of Incidence H ☉ *f*	64	55
Angle of the Moon's Way add *f* ☉ *e*	5	45
Angle Orient = H ☉ *e*	70	40

With this Angle, and the Sun's opposite Place ♑ 22° 21′ 24″ (it being now the Cusp of the Ascendant, because the Sun is setting) Enter the Table of the Angle Orient, and there you will find the Latitude of the Place 9° 15′ North.

Or, by Calculation.



	°	′	
As C.t, ∠ ♈ ♑ œ ∠ Orient	70	44	9.545119
To Radius	90	00	10.000000
So C.S. ♑ ♈	67	39	9.580084
To C.t. ∠ ♑ ♈ R	42	42	10.034965
Sub. ∠ ♑ ♈ œ Obliquity	23	29	
Rem. ∟ œ ♈ R	19	13	
As S. ∟ ♑ ♈ R	42	42	Co Ar. 0.168668
To S. ∟ œ ♈ R	19	13	9.517382
So C.S. ∟ ♈ ♑ œ	70	42	9.519911
To S. Latitude North	9	15	9.205961

For the Aſcenſional Difference, ſay.

	° ′	
As Radius —	90 00	10.000000
To *t.* Latitude North	9 15	9.211815
So *t.* ⊙ Declinat. North	21 38	9.598354
To *S. A. Difference*	3 42	8.810169
Sun's R. Aſcenſion add	114 9	
Obl. Deſc. Deſcendant	117 51	
Add	90 0	
R. A. *M. Cæli*	207 51 0″	
R.A. *M.Cæli* at *London*	35 4 15	
Diff. Longitude Eaſt	172 46 45	

2. By the *Flamſteedian* Method.

OPERATION.

	°	′
Second Angle of Incidence H ⊙ *f*	64	55
Angle of Direction add *f* ⊙ C	15	7
Amplitude of the Path H ⊙ C	80	2

	° ′	
As Radius —	90 00	10.000000
To *C.S.* Sun's Declination	21 38	9.968278
So *C.S.* Amplitude of the Path	80 2	9.238835
To S. Latitude North	9 16	9.207113

For the Difference of Meridians:

	h. ′ ″	
The Aſc. Differ. 3° 42′ in Time is	0 14 48	
Add —	6 0 0	
Time Sun's ſetting	6 14 48	+ 24 Hours.
Time at *London* ſub.	18 43 41	
Diff. Meridians Eaſt	11 31 7	

Which reduced into Degrees and Minutes, are 172° 4[6′] 45″ Eaſt, as before. This Place falls on the Globe near th[e] Iſles *de los Reys*, Eaſt of the *Philippine* Iſlands.

6. B

8. To find the Place on the Globe, where the Sun sets as the Eclipse ends The Center of the Penumbra is then at I.

1. By the *Keplerian* Method.

OPERATION.

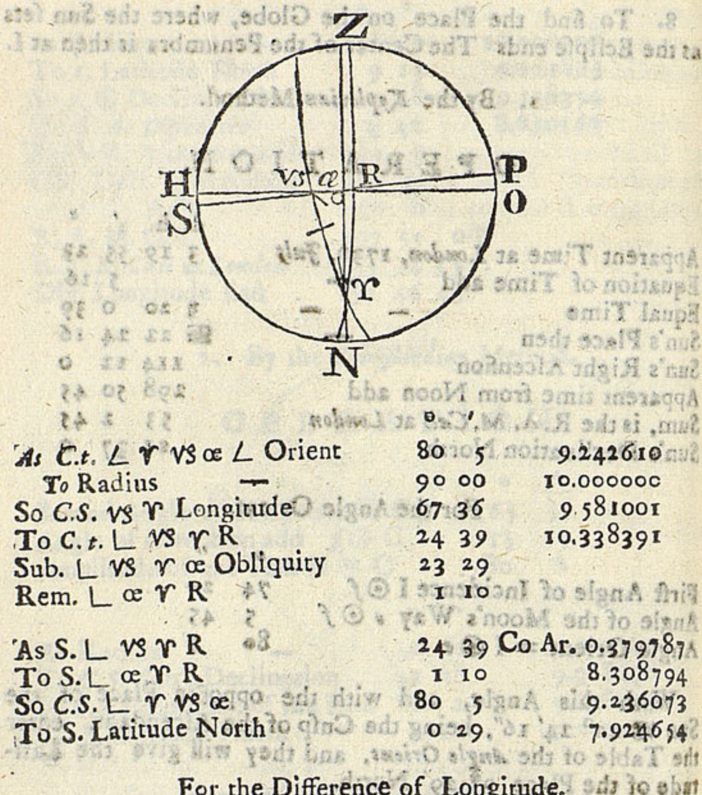
	d.	h.	′	″
Apparent Time at *London*, 1730, *July*	3	19	55	23
Equation of Time add —			5	16
Equal Time — —	3	20	0	39
Sun's Place then —	♋	22	24	16
Sun's Right Ascension		114	12	0
Apparent time from Noon add		298	50	45
Sum, is the R. A. *M. Cœli* at *London*		53	2	45
Sun's Declination North		21	37	0

For the Angle Orient.

	°	″
First Angle of Incidence I ⊙ *f*	74	20
Angle of the Moon's Way *e* ⊙ *f*	5	45
Angle Orient = I ⊙ *e*	80	5

With this Angle, and with the opposite Place of the Sun ♑ 22° 24′ 16″, being the Cusp of the Ascendant, enter the Table of the *Angle Orient*, and they will give the Latitude of the Place 0° 29′ North.

Or, by Calculation.



	° ′	
As C.t. ∠ ♈ ♑ œ ∠ Orient	80 5	9.242610
To Radius	90 00	10.000000
So *C.S.* ♑ ♈ Longitude	67 36	9.581001
To *C.t.* ∟ ♑ ♈ R	24 39	10.338391
Sub. ∟ ♑ ♈ œ Obliquity	23 29	
Rem. ∟ œ ♈ R	1 10	
As S. ∟ ♑ ♈ R	24 39	Co Ar. 0.379787
To S. ∟ œ ♈ R	1 10	8.308794
So *C.S.* ∟ ♈ ♑ œ	80 5 (?)	9.236073
To S. Latitude North	0 29. (?)	7.924654

For the Difference of Longitude.

	° ′		
As Radius	90 00		10.000000
To t. Latitude North	0 29		7.926134
So t. ⊙ Declin. North	21 37		9.597985
To S.A. Difference	0 12		7.524119
Sun's R. Afcen. add	114 12		
Obl.Defc. Defcendant	204 24		
Add	90 0		
R. A. *M. Cæli*	204 24	0″	
R. A. M.C. at *London*	53 2	45	
Diff. Longitude Eaft	151 21	15	

2. By

2. By the *Flamsteedian* Method.

	°	′
First Angle of Incidence O ⊙ *f*	74	20
Angle of Direction *f* ⊙ C	15	07
Sum, is the Amplit. of the Path	89	27

	° ′	
As Radius —	90 00	10.000000
To C.S. ⊙ Declination	21 27	9.968328
So C.S. Amplit, of the Path	89 97	7.982233
To S. Latit. of the Place North	0 31	7.950561

For the Difference of Meridians.

	h. ′ ″	
The Ascen. Diff. 12′ in time is	0 0 48	
Add	6 0 0	
Time of Sun-setting	6 0 48	+ 24 Hours.
Time at *London* sub.	19 55 23	
Diff. Meridians to the East	10 5 25	

Which reduced into Degrees and Minutes, are 151° 21′ 15″. Which Place on the Globe falls to the East of the *Philippine* Islands.

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9. To find the Place on the Globe where the Sun's lower is just touch'd by the Moon's upper Limb in the Meridian.

Note, that which is the Sun's upper Limb in North Latitudes, is his lower in Southern Latitudes, and so *vice versa,* So that observing by your Calculation the Latitude where the Sun is Centrally Eclipsed in the Meridian, you will easily conceive whether a Spectator must travel North or South to elevate the Moon above, or depress her below the Sun, just that their Perimeters may touch each other.

From hence it is plain, that in North Latitudes the North side of the Luminaries are their upper side, and in South Latitudes the South side of the Luminaries are their upper side.

fide; that is, having them to the South of you in North Latitudes, and to the North of you in South Latitudes.

And this is what muft guide you to know (when you have found the diftance of the *Sun* from the *Vertex* in the Meridian by the following Analogy) when the *Sun* is to the North or to the South of your Zenith.

To which always apply the *Sun's* Declination at the time he is Centrally Eclipfed in the Meridian, and you will have the Latitude of that Place where the Edges of the *Sun* and *Moon* touch each other at that time.

Or, by obferving what I have faid of my univerfal Projection in Page 77, of Vol. I. of my *Syftem*, you may eafily find the Latitude of the Place thereby.

RULE.

To the Semidiameter of the Penumbra add the Diftance of the Sun in the Earth's Axis from the Center of the Disk; and if that Sum be lefs than the Semidiameter of the Earth's Disk, then it will always hold.

As the Semidiameter of the Earth's Disk in Seconds,
To Radius,
So is the Sum of the Semidiameter of the Penumbra, and Diftance of the Moon in the Earth's Axis in Seconds,
To the Sine of the Arch of the Meridian between the *Sun* and *Vertex*.

Then by the common known Rules in Navigation, where the Sun's Zenith-Diftance and Declination are given, to find the Latitude of the Place, Work, and you will have your defire.

Or, by my Univerfal Projection, if you fet the Sun's Declination to the Diftance from the *Vertex*, the two Ends of the Earth's Axis marked *S. P.* and *N. P.* will cut the graduated Meridian in the Latitude of the Place fought. See my *Syftem*, Vol. I. Page 77.

But if the Sum of the Semidiameter of the Penumbra, and Diftance of the Moon in the Earth's Axis exceed the Semidiameter of the Earth's Disk, then the Sun's lower will not touch the Moon's upper Limb in the Meridian any where.

Example, in the preſent-nam'd Eclipſe.

OPERATION.

	′	″	
Semidiameter of the Penumbra	30	42	
Diſt. ☽ in ⊖ Axis from the Center Disk	23	38	= ⊙ C add
Sum ———	54	20	

This exceeding the Semidiameter of the Earth's Disk 53′ 49″, proves it not to be ſeen any where: For the Sun will be depreſs'd below the Southern Horizon before the Moon's upper Limb touches it, as I ſhall further prove by and by.

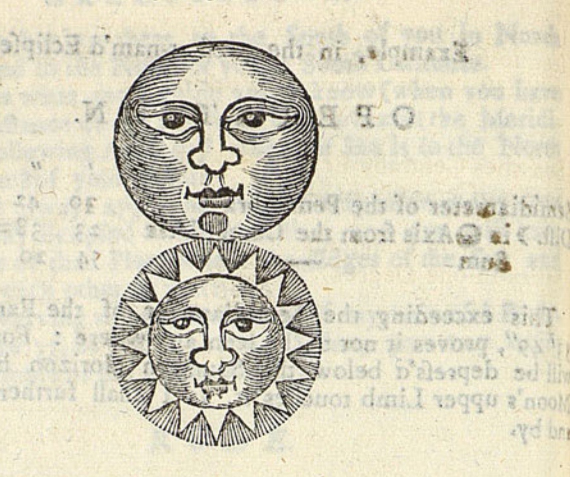
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10. To find the Place on the Globe, where the Sun's Upper is juſt touch'd by the Moon's Lower Limb in the Mid-Heaven.

RULE.

In this Caſe you muſt take the Difference between the Semidiameter of the Penumbra, and the Diſtance of the Moon in the Earth's Axis from the Center of the Disk; and then ſay as in the 9th above.

Example in the preſent named Eclipſe.



OPERATION.

	°	′
Semidiameter of the Penumbre	30	42
Dist. ☽ in ⊖ Axis from Center of the Disk sub.	23	38
Difference — —	7	4

Now say,

As the Semidiameter of *Earth*'s Disk	3229″		3.509068
To Radius —	90°	00′	10.000000
So is the Diff. Penumb. and ☽ in ⊖'s Axis	4	24	2.627366
To S. Arch Merid. betw. ☉ & *Vertex* Sou.	7	33	9.118298
Sun's Declination North add	21	38	
Latitude of the Place North	29	11	

And Longitude 109° 9′ 45″ from *London*, being the same with that where the Sun is Centrally Eclipsed in the Meridian; which Place (in this Eclipse) would fall on the Globe near *Tchute* in *China*, if it were conspicuous; observe the following Caution.

The Central Shade enters the Earth on the Eastern Coast of the Isle *Candia*, near the Entrance of the *Archipelago* Sea, and bends its Course over the North Parts of *Asia Minor*, and the *Caspian* Sea, thro' *Great Tartary* and the *Japan* Sea, and from thence into the great Eastern Ocean, where it leaves

leaves it about the Isles *de los Reys*, where the Sun may be seen to set Centrally Eclipsed; so that the *Central Shade* travels East, as the following Work shews.

	°	′	″	
Sun rises Centrally Eclips. in the Longit.	25	13	45	East.
Sun sets Centrally Eclips. in the Longit.	176	46	45	East.
Difference in Longitude	151	33	0	
Miles in one Degree —	69.5			
	735			
	1323			
	882			
	10216.5			
Add	33			
English Miles	10249 ½ the Central Shadow travels Eastward.			

For the Breadth of the Shade from *North* to *South*.

OPERATION.

	°	′
From a Quadrant — —	90	0
Sub Lat. where ☉'s upper is touch'd by ☽'s lower Edge	29	11
Dist. of that Place from the North Pole	60	49
Sun's Declination North add	21	38
Breadth of the Shadow	82	27
Miles in one Degree	69.5	
	410	
	738	
	492	
	5699.0	
Add	27	
English Miles	5726	

Note,

Note, The 27′ are $\frac{27}{60}$, which will be reduced to $\frac{45}{100}$; but it being so inconsiderable in this case, it matters not whether it is altered or not.

Caution.] *Note*, The Breadth of the shadow 82° 27′, being less than a Quadrant, also proves that the *Sun's* lower Edge is not any where touched by the *Moon's* upper in the Meridian: For if you travel Northward beyond the Pole, until you be 82° 27′ distant from the *Sun*, there will be a small Portion of the *Sun's* lower Limb obscured from your sight, by the Interposition of the *Moon*,

And if you go on further, until you be 90 Degrees distant from the *Sun*, you will then have him in the Horizon, before he is got clear of the Eclipse; so that it is impossible for the *Sun's* lower Limb to be touched by the *Moon's* upper, any way in this Eclipse.

For the Velocity of the *Shadow* in this Eclipse.

OPERATION.

True hourly Motion ☽ à ☉ 27′ 21″ Decimally	27′.35
Miles in one Degree on the Earths surface	69.5
	13675
	24615
	16410
Moons Shad. travels in an Hour *English* Miles	1900.825

Which divided by 60′, gives 31.68 Miles in a Minute; a Motion, indeed, that would require *Pegasus* or *Perseus's* Horse to keep pace with it.

When you have finished your Eclipse, it will be best to construct it for those Latitudes (according to Precept 18. Page 419. of my *System*) where you find by Calculation the *Sun* and *Moons* upper and lower Limbs just touch in the Meridian, and that 'twill strengthen your Judgment, and confirm your Work.

CHAP.

CHAP. XVI.

The Calculation of the principal Appearances of the Sun's Eclipse, April 11, 1735.

Eq. Time tr. ☌.	Longit. ☉.				Anom. ☉.			
	S	°	′	″	S.	°	′	″
Anno 1735	9	20	29	42	6	12	9	27
April 11	3	9	33	1	3	9	32	44
Hours 11			27	6			27	6
8′ 56″			2	18			2	18
Mean Motion	1	0	32	6	9	22	11	35
Equation add		1	46	51				
Sun's tru. Place	1	2	18	57				

Eq. Time tr. ☌	Longit. ☽.				Anom. ☽.				Node ☽.			
Anno 1735	4	19	48	37	7	8	0	34	6	29	47	30
April 11	8	10	48	57	7	29	33	50		5	20	54
Hours 11		6	2	21		5	59	17			1	27
Minutes 56			30	45			30	29				7
Seconds 8				4				4		5	22	28
Mean Motion	1	7	10	44	3	14	4	14	6	24	25	2
Equat. sub.		4	51	47								
☽ in her Orb	1	2	18	57								
Node sub.	6	24	25	2							′	″
Arg. Lat.	6	7	53	55	*Hourly* Mot. of				{ ☉		2	28
True Lat. *S. A.*			41	11					☽		34	31
Reduct. sub.			1	47	*Hourly Mo.* ☽ à				☉		32	3
Ecliptic Place	1	2	17	10								

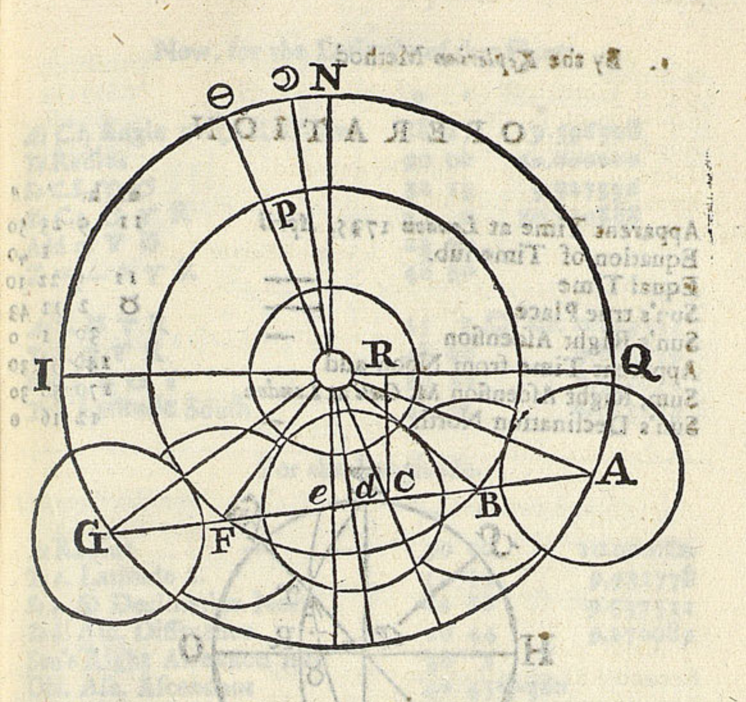
Equal

	d.	h.	′	″
Equal Time, true ☌ at *London* 1735, *April*	11	11	56	8
Equation of Time add			1	40
Apparent Time	11	11	57	48
Time of Reduction subtract and add			3	20
Apparent Time { Middle	11	11	54	28
of the { Ecliptic Conjunction	11	12	1	8
Diff. Hor. Parall. ☉ and ☽ = Semid. *Earths* Disk			58	18
Sem.diameter of { *Sun*			15	58
{ *Moon*			15	54
Sum, = Semidiameter of the Penumbra			31	52
Sum *Earths* Disk and Penumbra			90	10
Difference *Earths* Disk and Penumbra			26	26
True Latitude of the Moon *S. A.*			41	11
True Hourly Motion of ☽ à ☉			32	5
Angle of the Moons Way = *e* ☉ *d*		5°	38	0
Angle of the two *Axes* = *e* ☉ *c*		20	10	0
Angle of Direction = *d* ⊖ C		14	32	0
Suns Declination North		12	18	0
First Angle of Incidence = *d* ☉ A		62	49	0
Motion of half duration = A *d* 4812″ =		1	20	12
Time of half duration subtract and add		2	30	38
Second Angle of Incidence = *d* ☉ B		45	4	0
Motion of half duration Centr. B *d* = 2476″		0	41	16
Time of half duration Central sub. and add		1	17	7
Dist. Moon in *Earths* Axis = ☉ C 2552″			42	32
Motion from C to *d* = 640.6″			10	40
The same in Time sub.			19	58
Dist. Moon in Axis Ecliptic = ☉ *e*	2483″ =		41	23
Moons Latitude at C = *C* R	2396 =		39	56

By the above *Calculation*, I have found, when

	d.	h.	′	″
The Eclipse first begins at Sun-rising A *April*	11	9	23	50
Centrally eclipsed at Sun-rising B		10	37	21
Meridional Sun *Centrally Eclipsed* C		11	34	30
Middle at *d* — —		11	54	28
Nonagesimal Sun *Centrally Eclipsed* *e*		12	1	8
Central Eclipse ends at Sun-setting F		13	11	35
The *Eclipse* ends at Sun-setting G		14	25	6
After the Penumbra has spent in passing over ⊖		5	1	16

1. To



1. To find the Place on the Globe where the *Eclipse* begins at Sun-rising; the *Center* of the Penumbra is then at A.

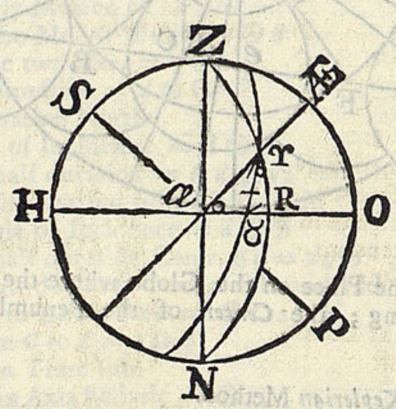
1. By the *Keplerian* Method.

OPERA-

1. By the *Keplerian* Method

OPERATION.

	d.	h.	′	″
Apparent Time at *London* 1735, *April*	11	9	23	50
Equation of Time sub.			1	40
Equal Time ———	11	9	22	10
Sun's true Place ———	♉	2	12	43
Sun's Right Ascension ——		30	1	0
Apparent Time from Noon add		140	57	30
Sum, Right Ascension M. *Cœli* at *London*		170	58	30
Sun's Declination North —		12	16	0



For the Angle Orient.

	°	′
First Angle of Incidence = *d* ☉ A	62	49
Angle of the Moon's Way = *c* ☉ *d* add	5	38
Angle Orient = *e* ☉ A	68	27

Now,

Now, for the Latitude of that Place.

	°	′	
As C.t. Angle ♈ ♉ R Orient	68	27	9.596508
To Radius	90	00	10.000000
So C.S. ♈ ♉	32	13	9.927396
To C.t. ♉ ♈ R	25	1	10.330888
Add æ ♈ ♉	23	29	
Z = ∠ æ ♈ R	48	30	
As S. ♉ ♈ R	25	1	Co Ar. 0.373781
To S. æ ♈ R	48	30	9.874456
So C.S æ ♉ ♈	68	27	9.565036
To S. Latitude South	40	35	9.813273

For the Longitude.

	°	′		
As Radius — —	90	00		10.000000
To t. Latitude S.	40	35		9.932778
So t. ☉ Declination North	12	16		9.337311
To S. Asc. Difference	10	44		9.270089
Sun's Right Ascension Add	30	1		
Obl. Asc. Ascendant	40	45	+360	
Sub.	90	0		
R. A. M. Cæli	310	45	0″	
R. A. M. Cæli at *London*	170	58	30	
Longitude East	139	46	30	

This Place falls on the Globe in the unknown Ocean South of *Hollandia Nova*.

2. By the *Flamsteedian* Method.

OPERATION.

	°	′
First Angle of Incidence = *d* ☉ *A*	62	49
Angle of Direction = *d* ☉ *C*	14	32
Amplitude of the Path *C* ☉ *A*	48	17

As

		°	′	
As Radius	— —	90	00	10.000000
To C. S. Amplitude of the Path		48	17	9.823114
So C. S. Sun's Declination		12	16	9.989970
To S. Latitude South		40	34	9.813084

For the Longitude of that Place.

	°	′	″	
Ascen. Difference in Time is	0	42	56	
Add	6	0	0	
Time of Sun-rising there	6	42	56	+ 12 Hours.
Time at *London* sub.	9	23	50	
Longitude East	9	19	6	= 139° 46′ 30″

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2. To find the Place B on the Globe, where the Center of the Pedumbra is, when the Sun rises Centrally Eclipsed.

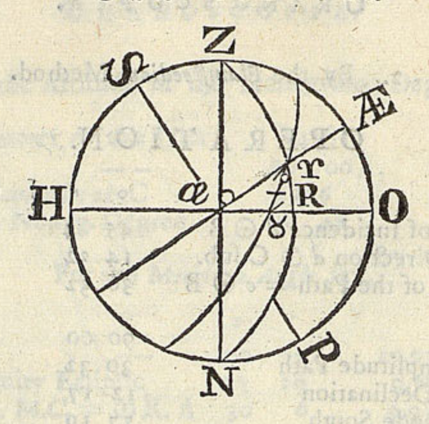
1. By the *Keplerian* Method.

		d.	h.	′	″
Apparent Time at *London*, 1735, *April*		11	10	37	21
Equation of Time subtract				1	40
Equal Time	— —	11	10	35	41
Sun's true Place	——	♉	2	15	41
Sun's Right Ascension	—		30	4	0
Apparent Time from Noon add			159	20	15
Sum, is R. A. *M. Cœli* at *London*			189	24	15
Sun's Declination North	—		12	17	0

For the Angle Orient.

	°	′	″
Second Angle of Incidence = *d* ☉ B	45	4	0
Angle of the Moon's Way = *e* ☉ *d* add	5	38	0
Angle Orient = *e* ☉ *b*	50	42	0

For



For the Latitude of the Place.

	°	′	
As C.*t*. ♈ ♉ R ∠ Orient	50	42	9.913014
To Radius	90	00	10.000000
So C.S. ♈ ♉ Longitude	32	16	9 927151
To C.*t*. ♉ ♈ R	44	4	10.014137
Add ∠ œ ♈ ♉	23	29	
Z=œ ♈ R.	67	33	

As S. ♉ ♈ R	44	4	Co Ar. 0.857706
To S. œ ♈ R	67	33	9.965772
So C.S. ♈ ♉ R	50	42	9.801665
To S. Latitude South	57	19	9.925143

For the Longitude of that Place.

	°	′		
As Radius —	90	00		10.000000
To *t*. Lat. South	57	19		10.192751
So *t*. ☉ Declin. North	12	17		9.334871
To S. Aſcen. Difference	19	42		9.527622
R. Aſcen. Sum add	30	4		
Obl. Aſc. Aſcen.	49	46		
Sub.	90	0		
R. A. M. *Cæli*	319	46	0′′	
R. A. M. *Cæli* at *London*	189	24	15	
Longitude Eaſt	130	21	45	

This Place falls on the Globe in the unknown *Southern Ocean.*

2. By the *Flamsteedian* Method.

OPERATION.

	°	′	
Second ∠ of Incidence *d* ⊙ B	45	4	
Angle of Direction *d* ⊙ C sub.	14	32	
Amplitude of the Path = *c* ⊙ B	30	32	
As Radius	90	00	10.000000
To *C.S.* Amplitude Path	30	32	9.935171
So *C.S.* ⊙ Declination	12	17	9.989912
To S. Latitude South	57	19	9.925083

For the Longitude of that Place.

Ascensional Difference in Time	1	18	48	
Add	6	0	0	
Time of Sun-rising there	7	18	48	+ 12 Hours.
Time at *London* sub.	10	37	21	
Longitude East	8	41	27	= 130° 21′ 45″

---

3. To find the Place C on the Globe, where the Center of the Penumbra is when the Sun is Centrally Eclipsed in the Meridian.

1. By the *Keplerian* Method.

OPERATION.

		D.	h.	′	″
Apparent Time at *London* 1735, *April*		11	11	34	30
Equation of Time sub.	—			1	40
Equal Time	—	11	11	32	50
Sun's true Place	—	♉	2	18	0
Sun's Right Ascension	—		30	6	0
Apparent Time from Noon add			173	37	30
Right Ascension M. Cœli at *London*			203	43	30
Sun's *Declination* North			12	18	0

For

For the Altitude of the Nonagesime Degree.

As Semidiameter of ☉'s Disk	3498″	3.543820
To Radius ——	90 00	10.000000
So Moon's Latitude at C	2396	3.379405
To *C.S.* Alt. Nonag. Degree	46 47	9.835585

For the *Meridian Angle* say,

	°	′	
As Radius ----	90	00	10.000000
To S. Obliquity Ecliptic	23	29	9.600409
So *C.S.* R.A. *M.C.* = ♉ R. A	30	6	9.937092
To *C.S.* Meridian Angle	69	50	9.537501

For the Dist. *M. Cœli* from Nonagesime Degree.

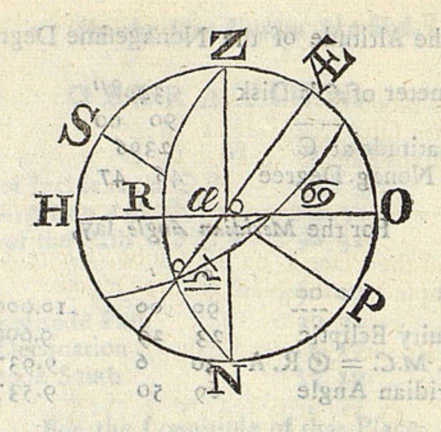
	°	′	
As Radius ——	90	00	10.000000
To *C.t.* Alt. Nonagesime	46	47	9.972948
So *C.t.* Meridian Angle	69	50	9.564983
To S. Dist. *M.C.* a Nonag.	20	11	9.537931

Now read Page 196.

		°	′	″
Sun's true Place	♉	2	18	0
Dist. subtract		20	11	0
Nonagesime Degree	0	12	7	0
Add always	3	0	0	0
Cusp of the Ascendant	3	12	7	0

For the Latitude of the Place.

	°	′	
As *C.t.* œ ♋ ♎ ∠ Orient	46	47	9.972948
To Radius ——	90	00	10.000000
So *C.S.* ♋ ♎ Longitude	77	53	9.322019
To *C.t.* R. ♎ ♋	77	25	9.349971
Sub. œ ♎ ♋	23	29	
Rem. R. ♎ œ	53	56	



	° ′		
As *S*. R ♎ ♋	77 25	Co Ar.	0.010559
To *S*. R. ♎ œ	53 56		9.907590
So C.S. œ ♋ ♎	46 47		9.835538
To S. Lat. S.	34 33		9.753687

For the Longitude of that Place.

R.A. ☉ is now *R. A. M. Cæli*	30° 6′ + 360°
R.A. M. Cæli at *London* ſub.	203 43 30″
Longitude to the Eaſt	186 22 30

This Place falls on the Globe in the unknown Southern Ocean.

2. By the *Flamſteedian* Method.

OPERATION.

	° ′	
As Semidiameter ☉'s Disk	3498″	3.543820
To Radius —	90 00	10.000000
So Diſt. ☽ in *Earth*'s Axis	2552	3.406881
To S. Diſt. ☉ from Vertex	46 51	9.863061
Sun's Declin. North ſub.	12 18	
Latitude South	34 33	

For the Longitude of that Place.

	h.	′	″
Time is there Noon =	24	0	0
Time at *London* ſub.	11	34	30
Diff. of Meridians Eaſt	12	25	30 = 186° 22′ 30″

4. To find the Place *e* on the Globe, where the Sun is Centrally Eclipſed in the Nonageſime Degree.

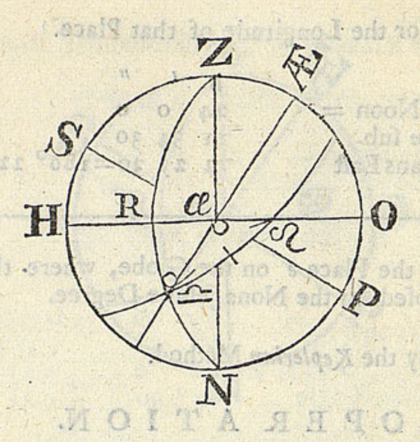
1. By the *Keplerian* Method.

OPERATION.

	d.	h.	′	″
Apparent Time at *London* 1735, *April*	11	12	1	8
Equation of Time ſub.			1	40
Equal Time	11	11	59	28
Sun's true Place	♉	2	19	4
Sun's Right Aſcenſion		30	7	0
Apparent Time from Noon add		180	17	0
Sum, R. Aſcenſion *M. Cæli* at *London*		210	24	0
Suns Declination North		12	18	0

For the Altitude of the Nonageſime Degree.

	°	′	
As Semidiameter of the *Earths* Disk	3498″		3.543820
To Radius ——	90	00	10.000000
So Diſt. ☽ in Axis Ecliptic	2483		3.394977
To C.S. Altitude Nonageſime	44	48	9.851157
Suns Place = to Nonageſ. Degree	1	2	19′
Add	3	0	0
Sum, = to Cuſp Aſcendant	4	2	19



For the Latitude of that Place.

	°	′	
As *C.t.* œ ♌ ♎ Orient	44	48	10.003032
To Radius —	90	00	10.000000
So *C.S.* ♌ ♎ Longitude	57	41	9.728027
To *C.t.* R ♎ ♌	62	2	9.724995
Sub. ∠ œ ♎ ♌	23	29	
Rem. R. ♎ œ	38	33	
As S. R. ♎ ♌	62	2	Co Ar. 0.053931
To S. R. ♎ œ	38	33	9.794626
So *C.S.* R ♌ ♎	44	48	9.850996
To S. Latitude South	30	3	9.699553

1. For the Declination of the Ascendant ♌ 2° 19′.

	°	′	
As Radius —	90	00	10.000000
To S. Longitude à ♎	57	41	9.926911
So S. Obliquity	23	29	9.600409
To S. Declination North	19	41	9.527320

2. For

2. For the Right Ascension Ascendant ♌ 2° 19'.

	° ′	
As Radius	90 00	10.000000
To C.S. Obliquity	23 29	9.962453
So *t.* Longitude	57 41	10.198884
To *t.* from *Libra* sub.	55 23	10.161337
From	180 0	
Right Ascension	124 37	

3. For the Ascensional Difference of the *Ascendant* ♌ 2° 19′

	° ′	
As Radius —	90 00	10.000000
To *t.* Latitude South	30 3	9.762314
So *t.* Declination North	19 41	9.553548
To S. Asc. Difference add	11 57	9.315862
R. *A. Ascendant* add	124 37	
Obl. *Asc. Ascendant*	136 34	
Snb.	90 0	
R.A. *M.Cœli*	46 34+360°	
R. A. *M. Cœli* at *London* sub.	210 24	
Longitude East	196 10	

This Place falls on the Globe in the unknown Southern Ocean.

2. By the *Flamsteedian* Method.

OPERATION.

As Semidiameter of the Sun's Disk	3498″	3.543820
To Radius —	90 00	10.000000
So Dist. ☽ in Axis Ecliptic	2483	3.394977
To S. Azim. between ☉ and Vertex	45 13	9.851157

Now say,

	°	′	
As Radius —	90	00	10.000000
To *C. S.* Inclination of the Axis	20	10	9.972524
So *t.* Sun's Distance from Vertex	45	13	10.003032
To *t.* of the Fourth Arch	43	23	9.975556

Now read Page 204.

	°	′
Sun's Distance from the South Pole	102	18
Fourth Arch subtract	43	23
Remains the Fifth Arch	58	55

Now say,

	°	′		
As *CS.* of the Fourth Arch	43	33	Co Ar.	0.138601
To *C. S.* of the Fifth Arch	58	55		9.712889
So *C. S.* ☉'s Dist. from Vertex	45	13		9.847836
To S. Latitude South	30	2		9.699326

For the Longitude of that Place.

	°	′		
As S. of the Fifth Arch	58	55	Co Ar.	0.067315
To S. of the Fourth	43	23		9.836878
So *t.* Inclination of the *Axis*	20	10		9.564583
To *t.* Hour from Noon in *Nonag.*	16	24		9.468776

Now read Page 205.

	h.	′	″		
From	24	0	0		
Sub. Time at *London*	12	1	8		
Complement	11	58	52 =	179°	43′
Add the Hour from Noon				16	24
Sum, is the Longitude East from *London*				196	7
West				163	53

5, To

5. To find the Place F on the Globe, where the Sun is seen to set Centrally Eclipsed.

2. By the *Keplerian* Method.

OPERATION.

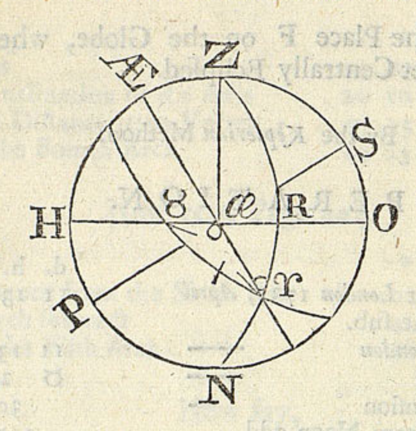
	d.	h.	′	″
Apparent Time at *London* 1735, *April*	11	13	11	35
Equation of Time sub.			1	40
Equal Time at *London* —	11	13	9	55
Sun's true Place —	♉	2	21	56
Sun's Right Ascension —		30	10	0
Apparent Time from Noon add		197	53	45
Sum, Right Ascension M. *Cæli* at *London*		228	3	45
Sun's Declination North —		12	19	0

For the Angle Orient.

	′	″
Second Angle of Incidence = *d* ⊙ F	45	4
Angle of the Moon's Way = *e* ⊙ *d*	5	38 sub.
Angle Orient = F ⊙ *e*	39	26

For

For the Latitude of the Place.



	° ′	
As *C. t.* ♈ ♉ R Orient	39 26	10.084926
To Radius —	90 00	10.000000
So C.S. ♉ ♈ Longitude	32 22	9.926671
To *C t.* ♉ ♈ R	55 13	9.841745
Sub. ♉ ♈ œ	23 29	
Rem. œ ♈ R	31 44	
As S. ♉ ♈ R	55 13	Co Ar. 0.085489
To S. œ ♈ R	31 44	9 720958
So C. S. ♈ ♉ R	39 26	9.887822
To S. Latitude South	29 39	9.694269

For the Longitude of that Place.

	° ′	
As Radius — —	90 00	10.000000
To *t.* Latitude South	29 39	9.755291
So *t.* ☉'s Declination North	22 19	9.339133
To S. Afcenfional Diff. fub.	7 8	9.094424
Sun's Right Afcenfion	30 10 from	
Oblique Defc. Defcendant	23 2	

Add

	°	′	″
Add —	90	00	00
Sum. R. A. *M. Cæli*	113	2	00
R. A. *M. Cæli* at *London* sub.	228	3	45
Rem. Longitude East	244	58	15

This Place falls on the Globe in the Pacifick Ocean.

2. By the *Flamsteedian* Method.

OPERATION.

	°	′
Second Angle of Incidence = F ⊙ *d*	45	4
Angle of Direction *d* ⊙ C add	14	32
Sum, Amplit. of the Path = F ⊙ C	59	36

	°	′	
As Radius —	90	00	10.000000
To *C. S.* Amplitude	59	36	9.704179
So *C.S.* ⊙ Declination	12	19	9.989887
To *S.* Latitude South	29	38	9.694066

For the Longitude.

	h.	′	″	
Ascen. Diff. in Time is	0	28	32	sub.
From	6	0	0	
Time Sun-setting there	5	31	28	+ 24 Hours.
Time at *London* sub.	13	11	35	
Longitude East	16	19	53	= 244° 58′ 15″

6. To

6. To find the Place G on the Globe, where the Center of the Penumbra is, when the Sun is seen to set as the Eclipse ends.

1. By the *Keplerian* Method.

OPERATION.

		d.	h.	′	″
Apparent Time at *London*, 1735, *April*		11	14	25	6
Equation of Time sub.	—			1	40
Equal Time	—	11	14	23	26
Sun's Place then	—	♉	2	24	55
Sun's Right Ascension			30	13	0
Apparent time from Noon add			216	16	30
Sum, is the R. A. *M. Cæli* at *London*			246	29	30
Sun's Declination North			12	20	0

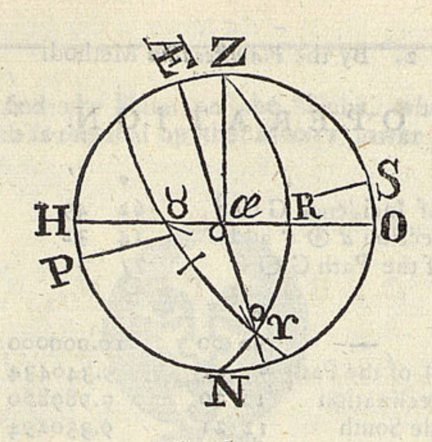
For the Angle Orient.

	°	′
First Angle of Incidence = G ⊙ *d*	62	49
Angle of the Moon's Way = *e* ⊙ *d*	5	38
Angle Orient = G ⊙ *e*	57	11

Now, for the Latitude of that Place.

	°	′	
As *C.t.* ♈ ♉ R. Orient	57	11	9.809471
To Radius	90	00	10.000000
So *C.S.* ♉ ♈ Longit.	32	25	9.926431
To *Ct.* ♉ ♈ R	37	23	10.116960
Sub. ♉ ♈ œ	23	29	
Rem. œ ♈ R	13	54	

As



	°	′		
As *S.* ♉ ♈ R	37	23	Co Ar.	0.216708
To *S.* œ ♈ R	13	54		9.380624
So *C.S.* ♈ ♉ R	57	11		9.733961
To *S.* Lat. South	12	23		9.331293

For the Longitude of that Place.

	°	′	
As Radius —	90	00	10.000000
To *t.* Latitude South	12	23	9.341552
So *t.* ⊙ Declinat. North	12	20	9.339739
To *S.* Asc. Difference sub.	2	46	8.681291
Sun's Right Ascension	30	13 from	
Obl. Asc. Descendant	27	27	
Add	90	00	
R. *A.* M. *Cœli*	117	27 + 360°	
R. *A.* M. *Cœli* at *London* sub.	246	29 30″	
Longitude East	230	57 30	

This Place falls on the Globe, in the *Mare del Zur.*

2. By

2. By the *Flamsteedian* Method.

OPERATION.

	°	′
First Angle of Incidence G ☉ *d*	62	49
Angle of Direction *d* ☉ *C* add	14	32
Amplitude of the Path G ☉ *C*	77	21

	°	″	
As Radius —	90	00	10.000000
To *C.S.* Ampl. of the Path	77	21	9.340434
To *C.S.* ☉ Declination	12	20	9.989860
To S. Latitude South	12	21	9.330294

For the Longitude of that Place.

	°	′	″	
Ascen. Diff. in Time is sub.	0	11	4	
From	6	0	0	
Time Sun-setting there	5	48	56	+ 24 Hours.
Time at *London* sub.	14	25	6	
Diff. Meridians East	15	23	50	= 230° 57′ 30″
From				360 0 0
Longitude from *London* West				129 2 30

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7. To find the Place on the Globe, where the Sun's lower is just touch'd by the Moon's upper Limb in the Meridian.

OPERATION.

	°	′
Semidiameter of the Penumbra	31	52
Moon's Distance in Earth's *Axis* add	42	32
Sum —	74	24
Exceeds the Semid. of the Earth's Disk	58	18

Which proves, this Phænomenon will not be any where conspicuous.

8. To

8. To find the Place on the Globe, where the Sun's upper Limb is touched by the Moon's lower Limb in the Meridian.



OPERATION.

	°	′
Semidiameter of the Penumbra	31	52
Dist. Moon in Earths *Axis* South	42	32
Difference ——	10	40

Now say,

	° ′	
As *Semidiameter* Earth's Disk	3498″	3.543820
To Radius ——	90 00	10.000000
So Difference in *Seconds*	640	2.806180
To S. Arch Merid. ☉ & *Vertex*	10 33	9.262360
Sun's Declination North	12 18	
Rem. Latitude North	1 45	

This Place falls on the Globe, in the unknown Ocean, North of *Mare del Zur*.

The

The Central Shade of the Moon in this Eclipſe firſt touch-eth the Globe in the unknown South Ocean Lat. 57° 19' S and Long. 130° 21' 45', Eaſt; and bends its Courſe North-Eaſterly, where in the ſame Ocean it gives the laſt ſtroke and goes down Centrally Eclipſed; but will ſcarce be ſeen by any, by reaſon of its Remoteneſs from the *European* Tra-ders. The *Shadow* paſſes over the Globe with a Velocity of 37 Miles in a Minute of Time.

In any *Solar Eclipſe,* when there are three Angles of Inci-dence (which I have explained in Page 181.) that Place on the Globe, where the *Sun* riſes as the Eclipſe ends, is the moſt remote Place to the Weſt of *London* that ſees any thing of the Eclipſe; and where the Eclipſe begins at *Sun-ſetting,* the moſt remote Place Eaſt of *London* that ſees any thing of it.

But if there are only two Angles of Incidence, that Place where the *Sun* riſes Centrally Eclipſed, is the remoteſt place Weſtward from *London*; and that place where he ſets Cen-trally Eclipſed, is the remoteſt place Eaſt, that ſees any thing of that Eclipſe.

Theſe things being rightly underſtood, when you have finiſhed the Work of any Eclipſe, according to the above Directions, have recourſe to a Terreſtrial Globe, and lay a Thread from the Place where the *Sun* riſes as the Eclipſe ends, in the firſt Caſe, to the place where the Eclipſe begins at *Sun-ſetting*; or, from the place, on the Globe, where the *Sun,* in the ſecond Caſe, riſes Centrally Eclipſed, to the place where he ſets Centrally Eclipſed; and that Thread, or a Chalk ſo drawn, ſhall repreſent the Paſſage of the Center of the Moon's ſhadow over that part of the Globe during the time of the Eclipſe.

CHAP. XVII.

The Calculation of the principal Appearances of the Sun's Eclipse, July 24, 1739.

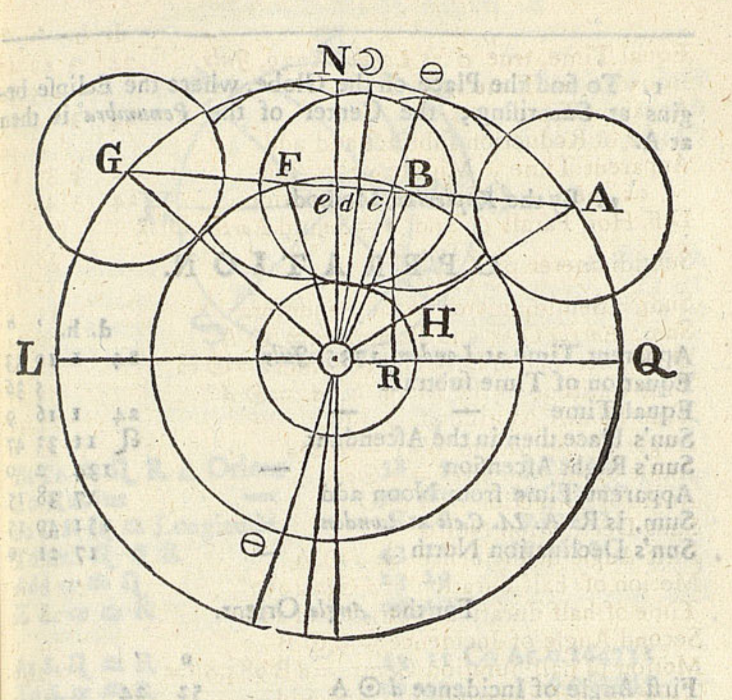
Eq. Time tr. ☌.		Longit. ☉.				Anom. ☉.							
		'	°	'	''	S.	°	'	''				
Anno 1739		9	20	31	30	6	12	7	11				
July	24	6	22	3	27	6	22	2	52				
Hours	3			7	24			7	24				
Minutes	49			2	1			2	1				
Seconds	47				2				2				
Mean Motion		4	12	44	24	1	4	19	30				
Equation add			1	4	27								
Sun's tru. Place		4	11	39	57								
Eq. Time tr. ☌		Longit. ☽.				Anom. ☽.				Node ☽.			
Anno 1739		10	10	31	28	7	15	57	20	4	12	25	27
April	24	6	1	9	39	5	8	19	21		10	51	21
Hours	3		1	38	49		1	37	59				24
Minutes	49			26	54			26	40				6
Seconds	47				26				26		10	51	51
Mean Motion		4	13	47	16	0	26	21	46	4	1	33	36
Equat. sub.			2	7	19							'	''
☽ in her Orb		4	11	39	57	*Hourly* Mot. of				{ ☉		2	24
Node sub.		4	1	33	36					{ ☽		29	55
Arg. Lat.		0	10	6	21								
True Lat. *S. A.*				52	35	*Tr. Hourly Mo.*				☽ à ☉		27	31
Reduct. sub.				2	15								
Ecliptic Place		4	11	37	42								

	d.	h.	'	"
Equal Time, true ☌ at *London* 1739, *July*	24	3	49	47
Equation of Time sub.			5	36
Apparent Time	24	3	44	11
Time of Reduction subtract and add			4	54
Apparent Time { Middle 1739, *July*	24	3	39	17
of the { Ecliptic Conjunction	24	3	49	5
Diff. Hor. Parall. ☉ and ☽ = Semid. *Earths* Disk			55	5
Semidiameter of { *Sun*			15	52
{ *Moon*			15	14
Sum, = Semidiameter of the Penumbra			31	6
Sum, *Earths* Disk and Penumbra = ☉ A			86	11
Difference *Earths* Disk and Penumbra = ☉ H			22	59
True Latitude of the Moon N. *A.* = ☉ *d*			52	35
True Hourly Motion of ☽ à ☉			27	31
Angle of the Moons Way = *e* ☉ *d*		5°	41	0
Angle of the two *Axes* = *e* ☉ *c*		16	7	0
Angle of Direction = *d* ☉ C		10	26	0
Suns Declination North		17	19	0
First Angle of Incidence = *d* ☉ A		52	24	0
Motion of half duration = *d* ☉ *c* 4097"		1	8	17
Time of half duration subtract and add		2	28	44
Second Angle of Incidence = *d* ☉ B		17	20	0
Motion of half duration Centr. = *d* B 984.6" =			16	24.6
Time of half duration sub. and add			35	47
Dist. Moon in *Earths* Axis = ☉ C 3208"			53	28
Motion from *C* to *d* = 581"			9	41
The same in Time sub.			21	7
Dist. Moon in Axis Ecliptic = ☉ *e* 3171"			52	51
Moons Latitude at *C* = *C* R = 3082"			51	22

Now, according to Precept 17, of my *System*, I have by the above *Calculation*, found the times when

	d.	h.	'	"
The Eclipse begins at Sun-rising A 1739, *July*	24	1	10	33
Centrally Eclipsed at Sun-rising B		3	3	30
Meridional Sun *Centrally Eclipsed* C		3	18	10
Middle at *d* — —		3	39	17
Nonagesimal Sun *Centrally Eclipsed* *e*		3	49	5
Central Eclipse ends at Sun-setting F		4	15	4
The *Eclipse* ends at Sun-setting G		6	8	1
Total Duration is		4	57	28

You



You are always to observe, that that Pole which is of the same Name with the Sun's Declination, is always illuminated; which in this Scheme falls in the Earth's *Axis* near C; which Pole is purposely omitted, to prevent crowding the Figure too much.

To find the Pole in the enlightned Disk in any Projection (of this nature) make the Semidiameter of the Earth's Disk the Radius of a Line of *Sines* on the *Sector*; and from thence take the *Sine* of the ☉'s Distance from the nearest Pole, and set it in the Projection from ☉ to *P* in the Earth's *Axis*, and that gives the place of the enlighten'd *Pole* in the Earth's Disk; and it is the North Pole, if the Sun hath North Declination; but the South, if he hath South Declination.

1. To find the Place on the Globe, where the Eclipse begins at Sun-rising; the Center of the *Penumbra* is then at A.

1. By the *Keplerian* Method.

OPERATION.

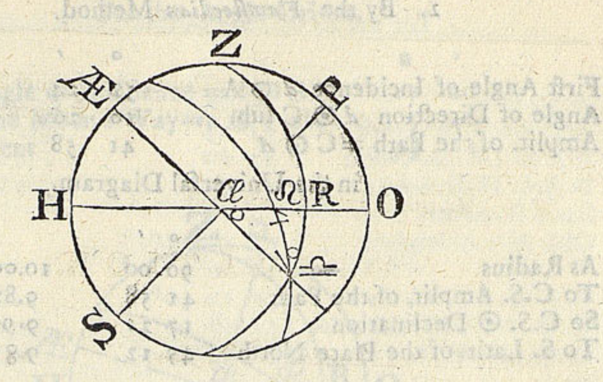
	d.	h.	′	″
Apparent Time at *London*, 1735, *July*	24	1	10	33
Equation of Time subtract			5	36
Equal Time — —	24	1	16	9
Sun's Place then in the Ascendant	♌	11	33	47
Sun's Right Ascension —		134	2	0
Apparent Time from Noon add		17	38	15
Sum, is R. A. *M. Cæli* at *London*		151	40	15
Sun's Declination North —		17	21	0

For the *Angle* Orient.

	°	′
First Angle of Incidence *d* ⊙ A	52	24
Angle of the Moon's Way =*e* ⊙ *d* add	5	41
Angle Orient =*e* ⊙ A in Scheme above	58	05

For the Latitude of the Place in the following Scheme.

As



	°	′	
As Ct. ♎ ♌ R ∠ Orient	58	5	9.794383
To Radius —	90	00	10.000000
So C.S. ♌ ♎ Longitude	48	26	9.821835
To Ct. ♌ ♍ R	43	11	10.027452
Add æ ♎ ♌	23	29	
Z ∠ æ ♎ R	66	40	
As S. ♌ ♎ R	43	11	Co Ar. 0.164731
To S. æ ♎ R	66	40	9.962945
So C.S. ♎ ♌ R	58	5	9.723197
To S. Latitude North	45	11	9.850873

For the Longitude of this *Place*.

	°	′	
As Radius — —	90	00	10.000000
To *t*. Latitude North	45	11	10.002779
So *t*. ☉'s Declination North	17	21	9.494743
To S. Aſcenſional Difference ſub.	18	20	9.497522
Sun's Right Aſcenſion from	134	2	
Rem. Oblique Aſcenſion	115	42	
Sub.	90	00	
R. *A. M. Cæli*	25	42	0′+360°
R. *A. M. Cæli* at *London*	151	40 15	
Longitude Eaſt	234	1 45	W. 125° 58′ 15″

This *Place* falls on the Globe, in the unknown Ocean, between *China* and *America*.

2. By the *Flamsteedian* Method.

	°	′
First Angle of Incidence *d* ☉ A	52	24
Angle of Direction *d* ☉ C sub.	10	26
Amplit. of the Path = C ☉ *A*	41	58

in the Universal Diagram.

	° ′	
As Radius —	90 00	10.000000
To C.S. Amplit, of the Path	41 58	9.871301
So C.S. ☉ Declination	17 21	9.979776
To S. Latit. of the Place North	45 12	9.851077

For the Difference of Meridians.

	h. ′ ″	
The Ascen. Diff. in time is	1 13 20	
From	6 0 0	
Time of Sun-rising	4 46 40	+ 24 Hours.
Time at *London* sub.	1 10 33	
Diff. Meridians to the East	15 36 7	= 134° 1′ 45″ (as before.

2. To find the Place B on the Globe, where the Center of the *Penumbra* is when the Sun is seen to rise Centrally Eclipsed.

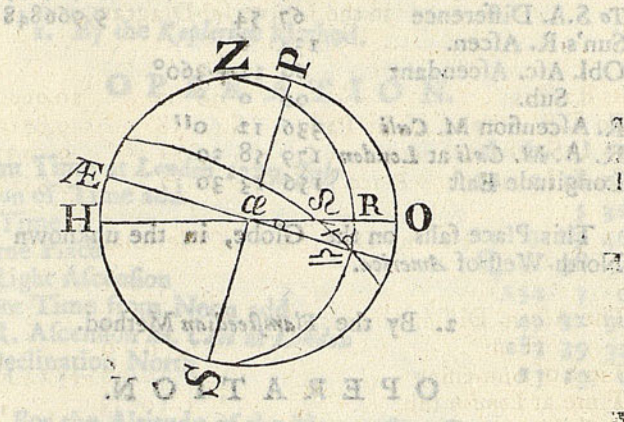
1. By the *Keplerian* Method.

OPERATION.

	d.	h.	′	″
Apparent Time at *London*, 1739, *July*	24	3	3	30
Equation of Time add			5	36
Equal Time	24	3	9	6
Sun's true Place	♌	11	38	18
Sun's Right Ascension		134	6	0
Apparent Time from Noon add		45	52	30
Sum R.A. *M. Cæli* at *London*		179	58	30
Sun's Declination North		17	20	0

For the Angle Orient.

	°	′
Second Angle of Incidence = *d* ☉ B	17	20
Angle of the Moon's Way = *e* ☉ *d* add	5	41
Angle Orient	23	1



For the Latitude of the Place.

	°	′	
As *C.t.* ♎ ♌ R	23	1	10.371797
To Radius	90	00	10.000000
So. C.S. ♌ ♎	48	22	9.822404
To *C. t.* ♌ ♎ R	74	14	9.450607
Add œ ♎ ♌	23	29	
Z=œ ♎ R	97	43	Compl. 82° 17′
As S. ♌ ♎ R	74	14	Co Ar. 0.016655
To S. œ ♎ R	82	17	9.996066
So C.S. ♎ ♌ R	23	1	9.963972
To S. Lat. North	71	23	9.956693

For the Longitude of this Place.

	°	′	
As Radius	90	00	10.000000
To t. Latitude North	71	23	10.472549
So t. ☉ Declin. North	17	20	9.494299
To S.A. Difference	67	54	9.966848
Sun's R. Aſcen.	134	6	
Obl. Aſc. Aſcendant	66	12+360°	
Sub.	90	0	
R. Aſcenſion *M. Cœli*	336	12 0′′	
R. A. *M. Cœli* at *London*	179	58 30	
Longitude Eaſt	156	13 30	

This Place falls on the Globe, in the unknown Ocean, North-Weſt of *America.*

2. By the *Flamſteedian* Method.

OPERATION.

	°	′
Second ∠ of Incidence *d* ☉ B	17	20
Angle of Direction *d* ☉ *C* ſub.	10	26
Amplitude of the Path = *C* ☉ B	6	54

	°	′	
As Radius —	90	00	10.000000
To *C.S.* Amplitude of the Path	6	54	9.996811
So *C. S.* Sun's Declination	17	20	9.979816
To S. Latitude North	71	22	9.976628

For the Difference of Meridians.

	d.	h.	′
Aſc. Difference in time is	4	31	36
From	6	0	0
Time Sun-riſing	3	28	24 + 12 Hours.
Time at *London* ſub.	3	3	30
Diff. Meridians Eaſt	10	24	54 = 156° 13′ 30″.

3. To

3. To find the Place C on the Globe, where the Center of the *Penumbra* is, when the Sun is Centrally Eclipsed in the Meridian.

1. By the *Keplerian* Method.

OPERATION.

	d.	h.	′	″
Apparent Time at *London* 1789, *July*	24	3	18	10
Equation of Time add			5	36
Equal Time	24	3	23	46
Sun's true Place	♌	11	38	54
Sun's Right Ascension		134	7	0
Apparent Time from Noon add		49	32	30
Sum, R. Ascension *M. Cæli* at *London*		183	39	30
Suns Declination North		17	19	0

For the Altitude of the Nonagesime Degree.

	°	′	
As Semidiameter of the *Earths* Disk	3305″		3.519171
To Radius —	90	00	10.000000
So ☽'s Latitude at C	3082		3.488833
To C.S. Altitude Nonagesime Degr.	21	10	9.969662

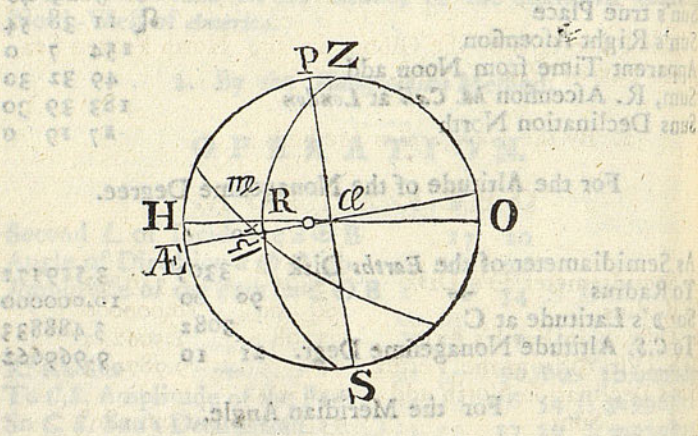
For the Meridian Angle.

	°	′	
As Radius —	90	00	10.000000
To S. Obliquity	23	29	9.600409
So C.S. R.A. *M.C.* = ☉ *R.A.*	45	53	9.842685
To C.S. Meridian Angle	73	54	9.443094

For Distance *M.C.* from Nonagesime Degree.

	S.	°	'	"
As Radius —		90	00	10.000000
To *C.t.* Alt. Nonag. Degree		21	10	10.412059
So *C.t.* Meridian Angle		73	54	9.460349
To S. Dist. *M.C.* à Nonag.		48	12	9.872408
Sun in the Meridian	♌	11	38	54"
Rem. Nonag. Degree	2	23	26	54
Add	3	0	0	0
Cusp Ascendant	5	23	26	54
Complement = ♍ ♎	0	6	33	6

For the Latitude of this Place.



	°	'	
As C.t. ♎ ♍ R	21	10	10.412059
To Radius	90	00	10.000000
So C.S. ♍ ♎	6	33	9.997156
To C. t. ♍ ♎ R	68	58	9.585097
From ♍ ♎ œ	156	31	Comp. Æ ♎ ♍ 23° 29'
Rem. R ♎ œ	87	33	

	°	′	
As S. ♍ ♎ R	68	58 Co Ar.	0.029945
To S. R. ♎ œ	87	33	9.999603
So C.S. ♎ ♍ R	21	10	9.969665
To S. Lat. North	86	33	9.993213

Beyond the North Pole.

For the Longitude of that Place.

	h.	′	″
R. Ascen. ☉ now is *R. A. M. Cæli*	134	7	0+360°
R. A. M.C. at *London* sub.	183	39	30
Longitude East from *London*	310	27	30
Longitude West	49	32	30

This Place falls on the Globe, in the North Frozen Sea, North-East of *Great Tartary*.

2. By the *Flamsteedian* Method.

OPERATION.

	°	′	
As Semidiameter ⊖'s Disk	3305″		3.519171
To Radius	90	00	10.000000
So Dist. ☽ in Earth's Axis	3208		3.506234
To S. Dist. ☉ from the Vertex	76	5	9.987063
Sun's Declination North add	17	19	
Sum	93	24 Sub. from 180°	
Latitude North	88	36 beyond the Pole.	

For the Longitude of that Place.

	h.	′	″
Time is there Noon	24	0	0
Time at *London* sub.	3	18	10
Rem. Longitude East	20	41	50=310° 27′ 30″ *as above*

4. For

4. To find the Place *e* on the Globe, where the Sun is Centrally Eclipsed in the Nonagesime Degree.

1. By the *Keplerian* Method.

OPERATION.

	d.	h.	′	″
Apparent Time at *London*, 1739, *July*	24	3	49	5
Equation of Time sub. —			5	36
Equal Time —	24	3	54	41
Sun's Place then —	*Leo*	11	40	8
Sun's Right Ascension		134	8	0
Apparent time from Noon add		57	16	15
Sum, is the R. A. *M. Cæli* at *London*		191	24	15
Sun's Declination North		17	19	0

For the Altitude Nonagesime Degree.

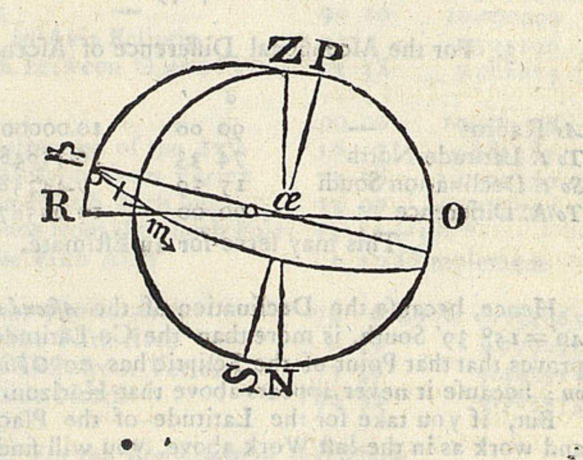
	°	′	
As Semidiameter Earth's Disk	3305″		3.519171
To Radius	90	00	10.000000
So Dist. ☽'s Axis Ecliptic	3171		3.501196
To C.S. Altitude Nonagesime	16	22	9.982025

The Complement of this is 73° 38′, ☉'s Distance from the Vertex; the same with the first Operation in the *Flamsteedian* Method.

		°		″
Sun's Place is = Nonag. Deg.	4s.	11	40	8
Add	3	00	00	0
Sum is the Cusp Ascend.	7	11	40	8

As

	°	′	
As C.s. R ♏ ♎ Orient	16	22	10.532120
To Radius	90	00	10.000000
So C.S. ♎ ♏ Longitude	48	20	9.873335
To C.s. R ♎ ♏	77	38	9.541215
Add∠ ♏ ♎ œ	23	29	
Z∠R ♎ œ	101	7	
From	180	0	
Remains	78	53	



	°	′		
As S. R ♎ ♏	77	38	Co Ar.	0.010196
To S.R ♎ œ	78	53		9.991774
So C.S. R ♏ ♎	16	22		9.982035
To S. Lat. North.	74	33		9.984008

For the Declination of the *Ascendant* ♏ 11° 40′ 8″

		°	′	
As Radius	—	90	00	10.000000
To S. Longitude	—	41	40	9.822688
So S. Obliquity	—	23	29	9.600409
To S. Declination South		15	39	9.423097

2. For

	° ′	
As Radius —	90 00	10.000000
To C.S. Obliquity	23 29	9.962453
So *t*. Longitude	41 40	9.949353
To *t*. of	39 13	9.911806
. Add	180 0	
R. A. Aſcendant	219 13	
R. A. M-Cæli	191 24	
———	27 49	

3. For the Aſcenſional Difference of Aſcendant.

	° ′	
As Radius —	90 00	10.000000
To t. Latitude North	74 33	10.558486
So t. Declination South	15 39	9.447384
To A. Difference	00 00	10 005870

This may ſerve for an Eſtimate.

Hence, becauſe the Declination of the *Aſcendant* ♏ 11° 40′=15° 39′ South, is more than the Co-Latitude 15° 27′, proves that that Point of the Ecliptic has no *Oblique Aſcenſion*; becauſe it never appears above that Horizon.

But, if you take for the Latitude of the Place 74° 21′, and work as in the laſt Work above, you will find the fourth proportional Sine to be equal to Radius 10.000000, or Sine of 90°.

So that when ever the like Caſe happens, you may ſave the trouble of working the two laſt Analogies.

To prove this, take a Globe, and elevate the Pole 74° 33′, and moving it round, you will find ♏ 11° 40′ will not aſcend the Horizon.

2. By

2. By the *Flamsteedian* Method.

OPERATION.

	° ′	
As Semidiameter Earth's Disk	3305″	3.519171
To Radius —	90 00	10.000000
So Dist. ☽ in Axis Ecliptic	3171	3.501196
To S. *Azim.* between ☉ and *Vertex*	73 38	9.982025
As Radius —	90 00	10.000000
To *C. S* Inclination of the Axis	16 7	9.982587
So *t.* Sun's Distance from Vertex	73 38	10.532120
To *t.* of the Fourth Arch sub.	73 00	10.514707
Sun's Distance from the North Pole	72 41+360°	
Remains the Fifth Arch	0 19 Complement	
As *CS.* of the Fourth Arch	73 0 Co Ar.	0.534065
To *C. S.* of the Fifth Arch	0 19	9.999993
So *C. S.* ☉'s Dist. from Vertex	73 38	9.449915
To S. Latitude North	74 32	9.983973

For the Longitude of that Place.

As S. of the Fifth Arch		0 19 Co Ar.	2.257523
To S. of the Fourth Arch	73	0	9.980596
So *t.* Inclination *Axis*	16	7	9.460829
To *t.* Hour à Noon in *Nonag.*	88	51	11.698948

	h. ′ ″	
From	24 0 0	
Time at *London*	3 49 5	
Complement	20 10 55	= 302° 33′ 45″
Add Hour from Noon		88 51 0
Longitude East		31 24 45

5. To

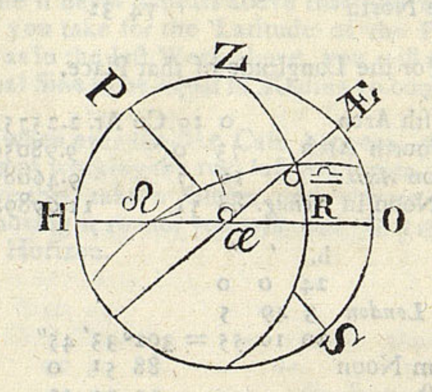
5. To find the Place F on the Globe, where the Sun is seen to set Centrally Eclipsed.

1. By the *Keplerian* Method.

		d.	h.	'	"
Apparent Time at *London* 1739, *July*		24	4	15	4
Equation of Time add				5	36
Equal Time at *London*	—	24	4	20	40
Sun's true Place	—	♌	11	41	9
Sun's Right Ascension	—	134		9	0
Apparent Time from Noon add		63		46	0
Sum, Right Ascension M. *Cæli* at *London*		197		55	0
Sun's Declination North	—	17		19	0

For the Angle Orient.

	'	"
Second Angle of Incidence = F ☉ *d*	17	20
Angle of the Moon's Way = *e* ☉ *d* sub.	5	41
Angle Orient = F ☉ *e*	11	39



	°	′	
As C. t. œ ♌ ♎	11	39	10.685753
To Radius	90	00	10.000000
So C.S. ♌ ♎	48	19	9.822830
To C. t. ♌ ♎ R	82	11	9.137077
Sub. ♌ ♎ œ	23	29	
Angle œ ♎ R	58	42	
As S ♌ ♎ R	82	11	Co Ar. 0.004054
To S. œ ♎ R	58	42	9.931691
So C.S. œ ♌ ♎	11	39	9.990960
To S. Lat. North.	56	25	9.926705

For the Longitude of that Place.

		°	′	
As Radius	----	90	00	10.000000
To *t* Latitude North		56	25	10.177846
So *t.* ☉ Declin. North		17	19	9.493854
To S. Asc. Difference		28	0	9.671700
Sun's R. Ascen. add		134	9	
Obl. Desc. Descend.		162	9	
Add		90	0	
R.A. M. Cœli		252	9	
R. A. M. Cœli at *London*		197	55	
Longitude East		54	14	

This Place falls on the Globe in the Eastern Parts of *Moscovia.*

2. By the *Flamsteedian* Method.

OPERATION.

	°	′
Second ∠ of Incidence F ☉ *d*	17	20
Angle of Direction *d* ☉ C add	10	26
Amplitude of the Path = F ☉ *c*	27	46

As Radius	90 00	10.000000
To *C.S.* Amplitude Path	27 46	9.946871
So *C.S.* ☉ Declination North	17 19	9 979855
To S. Latitude North	56 25	9.926726

For the Longitude of that Place.

	h.	′	″
Asc. Diff. in Time is	1	52	0
Add	6	0	0
Time of Sun-setting there	7	52	0
Time at *London* sub.	4	15	4
Longitude East	3	56	4 = 54° 14′ as before.

---

6. To find the Place G on the Globe, where the Center of the Penumbra is when the Sun is seen to set as the Eclipse ends.

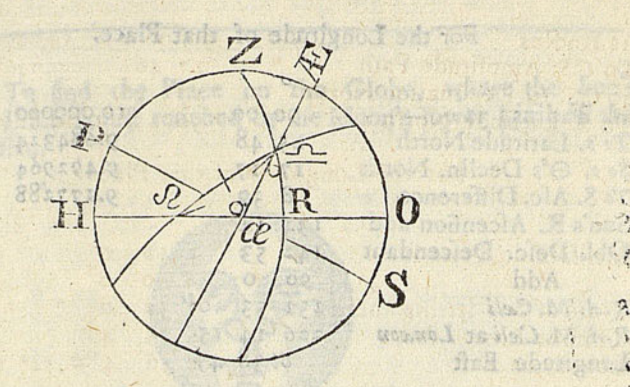
1. By the *Keplerian* Method.

		D. h.	′	″
Apparent Time at *London* 1739, *July*		24 6	8	1
Equation of Time sub.	—		5	36
Equal Time add	+	24 6	13	37
Sun's true Place	=	♌ 11	45	41
Sun's Right Ascension	+	134	14	0
Apparent Time from Noon add		92	0	15
Sum, *Right Ascension M. Cœli* at *London*		226	14	15
Sun's *Declination* North		17	17	0

For the Angle Orient.

	°	′
First Angle of Incidence G ☉ *d*	52	24
Angle of the Moon's Way • ☉ *d* sub.	5	41
Rem. Angle Orient	46	43

For



For the Latitude of the Place.

	° ′		
As C.t. œ ♌ ♎	46 43		9.973907
As Radius	90 00		10.000000
So C.S. ♎ ♌	48 14		9.823538
To C.t. ♌ ♎ R	54 44		9.849631
Subtract ♌ ♎ œ	23 29		
Rem. œ ♎ R	31 15		
As S. ♌ ♎ R	54 44	Co Ar.	0.088058
To S. œ ♎ R	31 15		9.714977
So C.S. œ ♌ ♎	46 43		9.836075
To S. Latitude North	25 48		9.639110

For the Longitude of that Place.

	°	′		
As Radius —	90	00		10.000000
To t. Latitude North	25	48		9.684324
So t. ☉'s Declin. North	17	17		9.492964
To S. Asc. Difference	8	39		9.177288
Sun's R. Ascension add	134	14		
Obl. Desc. Descendant	142	53		
Add	90	0		
℞.*A. M. Cæli*	232	53	0″	
℞.*A. M. Cæli* at *London*	226	14	15	
Longitude East	6	38	45	

This Place falls on the Globe, near *Techart* in *Barbary*, a Province of *Biledulgerid*, North-East from the *Lybian* Desart.

2. By the *Flamsteedian* Method.

OPERATION.

	°	′
First Angle of Incidence G ☉ *d*	52	14
Angle of Direction *d* ☉ C add	10	26
Amplitude of the Path G ☉ C	62	50

	°	″	
As Radius —	90	00	10.000000
To *C.S.* Ampl. of the Path	62	50	9.659517
So *C.S.* ☉ Declination	17	17	9.979951
To S. Latitude Nortth	25	51	9.639468

For the Longitude.

	h.	′	″	
Ascen. Diff. in Time is	0	34	36	
Add	6	0	0	
Time Sun-setting there	6	34	36	
Time at *London* sub.	6	8	1	
Longitude East	0	26	35	= 6° 38′ 45″

3. To

7. To find the Place on the Globe, where the Sun's upper Limb is just touched by the Moon's lower Limb in the Meridian.



OPERATION.

	°	′
Semidiameter of the Penumbra	31	6
Dist. Moon in Earths *Axis*	53	28
Difference ——	22	12

Now say,

	°	′	
As *Semidiameter* Earth's Disk	3305″		3.519171
To Radius ——	90	00	10.000000
So Difference	1342		3.127752
To S. Dist. ☉ from *Vertex*	23	57	9.608581
Sun's Declination North add	17	17	
Sum Latitude North	41	14	

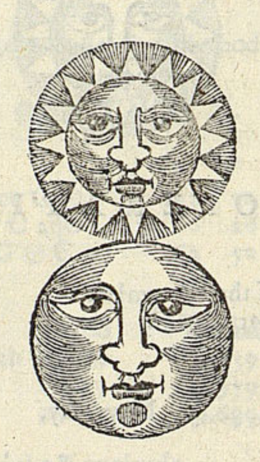
This Place falls on the Globe, in the North West Parts of *Persia*, near the *Caspian* Sea.

8. To find the Place on the Globe, where the Sun's lower is touch'd by the Moon's upper Limb in the Meridian.

OPERATION.

	°	′
Semidiameter of the Penumbra	31	6
Moon's Distance in Earth's Axis add	53	28
Sum —	84	34

This being more than the Semidiameter of the Earth's Disk, proves, this Phænomenon is not any where conspicuous.



The Central Shade first enters on the Globe, in the unknown Ocean North-West of *America*, and bends its Course Easterly, tending towards the South, passing over the Northern Parts of *America*, crossing the *Hyperborean* Sea, *Norway*, *Swedeland*, the Baltic, and the Gulph of *Finland*, where it enters *Moscovia*, near *Petersburgh*, and leaves the Earth near the Eastern Parts of *Moscovy*, where the Sun will set Centrally Eclipsed.

The *Moon*'s Shadow paſſeth over the Earth with a Velocity of almoſt 32 Miles in a Minute; which is but a ſlow pace in compariſon to what it goes when the *Moon* is in Perigeon; for then the Shadow travels with a Velocity of 41 Miles, 2 Furlongs, 37 Poles in a Minute, if it happens about the Middle of *June*; but at any other time of the Year its Velocity is ſomething leſs.

And if the Eclipſe happens at the *Moon*'s Apogeon, the Shadow moves only 31 275 Miles in a Minute, if this falls in the Middle of *December*; but at any other time ſomething more.

So that the two Extreams of the Motion of the Shadow of the *Moon* over the Earth's Disk during the time of a Solar Eclipſe, are 41 and 31 Miles in a Minute of time, omitting the Fractional Parts of a Mile, .296 and .275.

Sound only goes 11 Miles in a Minute; but Light travels with ſuch a prodigious Velocity, that it almoſt ſurpaſſes our Underſtanding: For when the Earth is in Perihelion, its Motion is no leſs than 15255859 Miles in a Minute of time. See my *Syſtem*, Vol. I. Page 442.

To exerciſe the young Tyro in theſe matters, I ſhall here ſubjoin the Times of the Great Eclipſe of the Sun, that will happen in 1748, according to the Tables in my *Syſtem*, uſing the new Equation in Page 111, of this Book.

		d.	h.	′	″
Equal time true ☌ 1748, *July*		13	23	28	25
Sun and Moon in	—	*Leo*	2	42	34

Hence the Apparent time at *London* of the

Beginning 1748. *July*	—	13	21	4	55
Viſible Conjunction	—		22	39	58
Greateſt Obſcuration			22	40	49
End —	—	14	0	19	1
Total Duration	—		3	14	6
Digits Eclipſed are on the upper ſide			10	26	13

The Times of the General Eclipse fall thus, *viz.*

Apparent time at *London* of the

	d.	h.	′	″
Beginning at Sun-rising, 1748, *July*	13	20	26	29
Central Eclipse begins at Sun-rising		21	40	34
Central *Eclipse* in the Meridian		23	3	9
Central *Eclipse* in the Nonagesime Degree		23	19	49
Middle, being at — —		23	25	7
End of the Central *Eclipse*, at Sun-setting		1	9	40
End at Sun-setting —		2	23	45
Duration —		5	57	16

The Latitudes and Longitudes where those Appearances happen, are,

	Lat. °	′		Long. °	′	
Sun begins to be *Eclipsed* at his Rising	35	9	N.	51	10	W.
Rises Centrally *Eclipsed*	45	23		76	17	
Centrally *Eclipsed* in the Meridian	51	38		14	13	E.
Centrally *Eclipsed* in the Nonagesime	48	47		20	8	
Sun sets Centrally *Eclipsed*	10	30		76	21	
Ends at Sun-setting	0	14	S.	53	59	
Suns upper toucht by ☽'s lower Limb	21	19	N.	14	13	

Sun's lower toucht by Moon's upper Limb beyond the Pole.

CHAP.

CHAP. XVIII.

To find by the Terrestrial Globe, the principal Appearances of Solar Eclipses.

1. GIVEN the Cusp of the Ascendant, with the Angle Orient, or Altitude of the Nonagesime Degree, to find where the Sun rises as the Eclipse begins.

EXAMPLE.

Let it be required to find the principal Appearances of the Sun's Eclipse, *July* 24, 1739?

Solution. I. *For the Latitude.*

Bring the Sun's Place ♌ 11° 33′ to the Eastern Horizon, and there stay the Globe: Then take 3 Signs from the Sun's Place, and there remains ♉ 11° 33′ for the Place of the Nonagesime Degree, which mark with a Chalk in the Ecliptic.

Then move the Brazen Meridian in the Notches of the Wooden Horizon, until the Place of the Nonagesime Degree be elevated 58° 5′; then will the Notch of the Northern cut the Brazen Meridian at 45° 11′, the Latitude of the Place North.

2. For the Difference of Meridians, or Longitude from *London*.

Bring the Sun's Place in the Ecliptic ♌ 11° 33′ to the Brazen Meridian, and there make a Mark with Chalk: Let the Globe be elevated to the Latitude of the Place just now found; bring *London* to the Meridian, and set the Index to the Time of the Eclipse 1 h. 11′.

Now move the Globe, till the Index point at 12 at Noon; and that Place on the Globe under the Mark made on the Brazen Meridian, is the Place where the Sun is Vertical at that time; bring this Place to the Eastern Horizon, and the

the Meridian cuts the Equator in 125° 58′ West of *London*; which Place is in the unknown Ocean, where the Sun will begin to rise just as the Eclipse begins.

---

2. To find the Place where the Sun will Rise *Centrally Eclipsed*.

1. For the Latitude.

The Sun's Place is *Leo* 11° 38′, the Altitude of the Nonagesime Degree 23° 1′, and the time at *London* 3′ past 3.

SOLUTION.

Bring the Sun's place in the *Ecliptic* ♌ 11° 38′ to the Eastern Horizon; then 3 Signs subtracted from it, leaves ♉ 11° 38′, the place of the Nonagesime Degree; which mark with Chalk. Then move the Meridian in the Notches of the Horizon, till you have the place of the Nonagesime ♉ 11° 28′ elevated upon the Quadrant of Altitude 23° 1′; then will the Notch of the Northern Horizon cut the Meridian at 71° 23′, which is the Latitude of the place sought.

2. For the Difference of Longitude.

Bring the Sun's Place to the Brazen Meridian, and there mark the Meridian with Chalk; elevate the Globe to the Latitude of the Place just found; bring *London* to the Meridian, and set the Index to the time of the *Eclipse* 3′ past 3; move the Globe, till the Index point at 12 at Noon: Here stay the Globe, and observe what place is under the Mark made on the Brazen Meridian; for there the Sun is Vertical at the given Time.

Bring this place (being marked with Chalk) to the Eastern Horizon, and the Degree of the *Equator* 156° 13′ that now lies under the Brazen Meridian is the Longitude of the place sought; Which place falls on the Globe, in the unknown Ocean; where the Sun will be seen to rise Centrally *Eclipsed*, it being in the Zenith, or highest part of the Globe at that time.

3. To

3. To find where the Sun is *Centrally Eclipsed* in the Nonagesime Degree.

1. For the Latitude.

Sun's Place ♌ 11° 40′, the Altitude of the Nonagesime Degree 16° 22′ and the time at *London* is 49′ past 3 in the Afternoon.

SOLUTION.

Mark the Sun's Place in the *Ecliptic* ♌ 11° 40′. This is now the place of the Nonagesime Degree. To it add three Signs, and it makes ♏ 11° 4′ for the Cusp of the Ascendant; which bring to the *Eastern* Horizon, and move the Brazen Meridian in the Notches of the Wooden Horizon, until the Nonagesime Degree (Sun's place) *Leo* 11° 40′ be elevated 16° 22′ upon the Quadrant of Altitude; then doth the Notch of the North Horizon cut the Meridian in 74° 33′, the Latitude of the place North.

2. For the Difference of Longitude.

The Globe standing elevated to the Latitude 74° 33′, as found above, mark the Sun's place in the *Ecliptic Leo* 11° 40′, bring that to the Meridian, and set the Index to 12 at Noon; then move the Globe, till the Index points at the given Hour at *London* 3 h. 49′ P. M. The Degrees of the *Equator* now under the Brazen Meridian 191° 24′ are the Right Ascension of the Mid-Heaven at *London*; which mark with Chalk: Then to the Sun's Place ♌ 11° 40′ add three Signs, the Sum is ♏ 11° 40′.

This Point of the *Ecliptic* doth not Ascend, [See *Page* 24] in that Latitude; for which reason the Globe cannot decide the Coutroversy.

4. To

4. To find the Place on the Globe, where the Sun is *Centrally Eclipsed* in the Meridian.

1. For the Latitude.

Given the *Sun*'s place ♌ 11° 38′, and the Altitude of the Nonagesime Degree 21° 10′, with the Nonagesime Degree ♊ 23° 26′.

SOLUTION.

To the Place of the *Nonagesime Degree* add three Signs; the Sum is ♍ 23° 26′, the Cusp of the Ascendant. Bring this to the *Eastern* Horizon, and move the Brazen Meridian in the Notches of the Wooden Horizon, until the place of the *Nonagesime Degree* ♊ 23° 26′ cut the Quadrant of Altitude in 21° 10′; then doth the Northern Notch of the Horizon cut the Brazen Meridian in 86° 34′ North beyond the Pole for the Latitude of that place.

2. For the Difference of Longitude.

SOLUTION.

Bring *London* to the Meridian, and set the Index to the given time of the *Eclipse* 3 h. 18′: Then move the Globe till the Index points at 12 at Noon.

Now the Degrees of the *Equator* under the Brazen Meridian are 49° 32′, which is the Longitude of the place to the West of *London*, where the Sun will be *Centrally Eclipsed* in the Meridian, and Latitude 86° 34′ *North* beyond the Pole.

5. To find the Place where the Sun ſets *Centrally Eclipſed.*

1. For the Latitude.

Given the Sun's Place ♌ 11 degr. 41 min. the Apparent time 4 h. 15′ P,M. and the Altitude of the Nonageſime Degree 11 degr. 39 min.

SOLUTION.

Becauſe in this Caſe the Sun is ſetting, bring his Place *Leo* 11 degr. 41 min. to the Weſtern Horizon; add three Signs to it, and you have the Place of the Nonageſime Degree ♏ 11 degr. 41 min.

Then move the Brazen Meridian in the Notches of the Horizon, until you bring the Nonageſime Degree ♏ 11 deg. 41 min. to be elevated upon the Quadrant of Altitude 11 degr. 39 min. equal to the Angle Orient: Then obſerve what Degree of the Brazen Meridian is cut by the Notch of the Wooden Horizon; for that is the Latitude, or Pole's Elevation ſought, which in this Example is 56 degr. 35 min. North.

2. For the Difference of Longitude.

Bring the Sun's Place in the Ecliptic *Leo* 11 degr. 41 min. to the Brazen Meridian, and over the Sun's place make a Mark on the Meridian, the Globe being elevated to the given Latitude 56 degr. 25 min. *North*; bring *London* to the Meridian, and ſet the Index to the time of the Eclipſe 4 h. 15′ P.M. Move the Globe, till the Index point at 12 at Noon. Here ſtay it, and obſerve what Place lieth under the Mark made on the Meridian (for that is the place where the Sun is Vertical at the given time) which is the Eaſt End of *Hiſpaniola.* Bring this place to the Weſtern Horizon, and the Degrees of the Equator.

Now.

Now, under the Meridian are 54° 14′, the Longitude East of *London* ; the Place now in the Zenith is the East *Moscovia*, where the Sun will set *Centrally Eclipsed.*

---

6. To find the Place where the *Eclipse* ends at Sun-setting.

Given the Sun's Place ♌ 11° 45′, the Apparent time at *London* 6 h, 8′ 59″ P. M. and the Altitude of the *Nonagesime Degree* 46° 43′.

1. For the Latitude of the Place.

Because the Sun is setting, bring his place in the *Ecliptic* ♌ 11 degr. 45 *min.* to the Western Horizon ; add three Signs to it, and you have the place of the *Nonagesime Degree* ♏ 11 degr. 45 min.

Then move the Brazen Meridian in the Notches of the Wooden Horizon, until you bring the *Nonagesime Degree* ♏ 11 degr. 45 min. to be elevated upon the Quadrant of Altitude 46 degr. 43 min. equal to the Angle Orient, or Altitude of the *Nonagesime Degree.* Then observe what Degree of the Meridian is cut by the *Northern Notch* of the Wooden Horizon ; for that is the Latitude or Poles Elevation sought, which in this Example is 25 degr. 48 min. *North.*

2. For the Difference of Longitude from *London.*

Bring the Sun's place in the *Ecliptic* ♌ 11° 45′ to the Brazen Meridian, and there on the Meridian make a Mark. The Globe being elevated to the just now found Latitude 25 degr. 48 min. N. bring *London* to the Meridian, and set the Index to the time of the Eclipse 6 h. 8′ P. M. Move the Globe back, till the Index point at 12 at *Noon.*

Here stay it, and observe what Degree of the *Equator* is under the Brazen Meridian ; for that is the place where the Sun is Vertical at the given time, which is the Gulph of *Mexico* in *America.*

Bring this Place to the Weſtern Horizon ; and the Degree of the Equator then under the Meridian is 6° 39′ Eaſt Longitude from *London*. Now look upon the Zenith of the Globe, and you will find *Techort* in *Barbary* ; at which place the Eclipſe will end at Sun-ſetting.

Thus have I fully demonſtrated by the Terreſtrial Globe all the Appearances of this Solar Eclipſe, which are all that can happen ; becauſe all the Penumbra doth not fall within the Earth's Disk. But in thoſe Eclipſes, when the Penumbra is all involved in the Disk, then there will be two more Caſes (as in the Sun's Eclipſe *December* 28, 1730,) that is, firſt, to find the Place where the Eclipſe is at Sun-riſing; and the other is, to find the Place where the Eclipſe begins at Sun-ſetting. Of theſe in their Order.

---

1. To find by the Terreſtrial Globe, the Place where the Sun's Eclipſe of *Dec.* 28, 1730, ended at Sun riſing.

	d.	h	′	″
Given the Apparent Time at *London*, *Dec.*	28	21	25	34
Sun's Place —	♑	17	43	0
Altitude of the *Nonageſime Degree*		90	48	0

1. For the Latitude of that Place.

SOLUTION.

Bring the Sun's Place in the Ecliptic ♑ 17 degr 43 min: to the Eaſtern Horizon (becauſe the Sun is riſing) and from it ſubtract three Signs, and you will have ♎ 17 degr. 43 min. for the Place of the *Nonageſime Degree*.

Then, becauſe its Altitude is 90 degr. 48 min. from the North Part of the Horizon (becauſe the Sum of the third Angle of Incidence 85 degr. 11 min. and the Angle of the Moon's Way 5 degr. 37 min. is more than a Quadrant) move the Braſs Meridian in the Notches of the Wooden Horizon, until the Place of the *Nonageſime* ♎ 17 degr. 43 min. be elevated 90 degr. 48 min. from the North part of the Horizon, or 89 degr. 12 min. from the South part thereof; then the Degrees cut by the Southern Notch of the Horizon upon the Braſs-

Braſs-Meridian, are 7 degr. 41 min. which is the Latitude of the Place South.

2. For the Difference of Longitude from *London.*

The Globe being elevated to the Latitude of 7 degr. 41 min. South, juſt now found, bring the Sun's Place in the Ecliptic ♑ 17° 43′, to the Brazen Meridian; make a Mark; then bring *London* to the Meridian, and ſet the Index to the time of the Eclipſe 21 h. 26′ *P.M.* Move the Globe, till the Index point at the upper 12, or Noon.

Now the Place on the Globe under the Meridian, which you mark'd, is the Sea betwixt the Kingdom of *Moniotapa* in South *Africa* and *Madagaſcar.* Here the Sun is Vertical at the given Time. Bring this Place to the Eaſtern Horizon (becauſe the Sun is riſing) and obſerve the Degrees of the Equator under the Meridian, which in this Example are 54 degr. 33 min. Weſt Longitude from *London.*

Now, as the Globe ſtands, look on the Zenith, and you will ſee the Country of the Amazons in South *America*; to which place the Eclipſe ends at Sun-riſing.

This is the moſt Weſterly Place that ſees the Eclipſe.

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2. To find the Place on the Globe where the Eclipſe begins at Sun-ſetting.

Given, the Apparent Time at *London* 22 h. 59 min. 38″, the Sun's Place ♑ 17 degr. 47 min. and the Altitude of the *Nonageſime Degree* 79 degr. 34 min.

1. For the Latitude.

SOLU-

SOLUTION.

Bring the Sun's Place ♑ 17° 47′ to the Weſtern Horizon (becauſe the Sun is ſetting) and to it add three Signs, and you will have ♈ 17° 47′ for the Place of the *Nonageſime Degree.* Then, becauſe its Altitude is 79 degr. 34 min. move the Braſs Meridian in the Wooden Notches of the Horizon, until the Place of the *Nonageſime Degree* ♈ 17° 47′ be elevated 79° 34′ from the South Horizon.

Now, the Degrees cut by the *Northern Notch* of the Wooden Horizon, are 16 degr. 36 min. and ſuch is the Latitude *North.*

2. For the Difference of Longitude.

The Globe being elevated to the Latitude 16 degr. 47 min. *North*, juſt now found, bring the Sun's Place in the Ecliptic ♑ 17 degr. 47 min. to the Braſs Meridian, and there make a Mark exactly over the Sun's Place; then bring *London* to the Meridian, and ſet the Index to the time of the Eclipſe 22 h. 59′ 38″ *P. M.* Move the Globe, till the Index points at 12 at Noon, the Place under the Mark on the Meridian, is the Weſtern Coaſt of *Monapotapa* in South *Africa.* Here the Sun is Vertical at the given time.

Bring this Place to the Weſtern Horizon (becauſe the Sun is ſetting.) Here ſtay the Globe, and ſee what Degrees are on the Equator under the Mark on the Meridian; for they are the Longitude from *London*, and are 98 degr. 4 min. Eaſt.

Now look on the Zenith of the Globe, and you will ſee *Pagu* in the *Eaſt Indies.* This is the moſt Eaſtern Place that ſees any thing of this Eclipſe.

Becauſe the Solution by the Terreſtrial Globe, of finding the Places where the Sun is Centrally Eclipſed in the *Nonageſime Degree* is the moſt difficult, and my Deſign of Writing being to make all things plain to the meaneſt Capacity; therefore for the ſake of my younger Readers, I will add another Example, which ſhall be of the Sun Centrally Eclipſed in the *Nonageſime Degree*, *Anno* 1730, *December* 27th, 22 h. 12′ 42″; Sun's Place ♑ 17° 45′, and the Altitude of the *Nonageſime Degree* 87° 46′.

SOLUTION.

1. For the Latitude of that Place.

Mark the Sun's Place in the Ecliptic ♑ 17 degr. 45 min. This is now the Place of the *Nonagesime Degree.*

To it add three Signs, and it makes ♈ 17 degr. 45 min. for the Cusp of the Ascendant; which bring to the Eastern Horizon: Keep it there, and move the Brass Meridian in the Notches of the Wooden Horizon, until the *Nonagesime Degree* (Sun's place) ♈ 17 degr. 45 min. be elevated upon the Quadrant of Altitude 87 degr. 46 min. from the South part of the Horizon; then doth the *South Notch* of the Horizon cut the *Brass Meridian* in 20 degr. 2 min. South, the Latitude sought.

2. For the Difference of Longitude.

The Globe standing elevated to the Latitude 20 degr. 2 min. South, mark the Sun's place in the Ecliptic ♑ 17 degr. 45 minutes, which bring to the Meridian, and set the Index to 12 at *Noon*; then move the Globe till the Index point at the given Hour 22 h. 13 min. at *London*, the Degrees of the Equator now under the Meridian 262 degr. 24 min, are the Right Ascension of the Mid-Heaven at *London*; which mark with Chalk. Then to the Sun's place add three Signs, the Sum is, ♈ 17° 45'. Bring this to the Eastern Horizon, and here stay the Globe; the Degrees of the Equator now on the Meridian are the Right Ascension of the Mid-Heaven 288 degrees 55 minutes, the Place where the Sun is Centrally Eclipsed in the *Nonagesime Degree*; which mark in the Equator with Chalk: Also count the Degrees in the Equator between these two Chalks, and you will find them to be 26 degrees 30 minutes, the Difference of Longitude from *London* East; because the time at *London* was more than 12 Hours; when it is less than 12 Hours, then it is West.

How exceeding pleasant must it be to the young Astronomer, to take the Terrestrial Globe in his hand, and at one View to see the principal Appearances of any Solar Eclipse! This, I say, is very satisfactory, by reason he may examine the Calculations, and by that means find out the Faults, if any.

CHAP. XIX.

Shewing how to observe the Phases of Venus *and* Mercury.

HE that understands what I have already wrote in my *System of the Planets demonstrated*, cannot but rightly conceive the true System of the World, I mean, the Heavenly Bodies themselves, and how they move in their several Orbits: For, since all the Planets, as well as our Earth, are Spherical, Opaque and Scabrous, or rough uneven Bodies, they do reflect every way the Sun's Rays which fall upon them.

And it follows also from hence, that one half of every Planet (nearly) or that Hemisphere which is turned nearest the Sun, will be illuminated by him, and the other Hemisphere must remain in Darkness.

And because the Orbits of the two inferiour Planets *Venus* and *Mercury* are inscribed within the Earth's Orb, they increase and decrease in Light as our Moon doth: For when they are in Conjunction with the Sun in the upper part of their Orb, the same Face that they then shew to the *Sun*, is also turned to our Earth, which is full, except when they are in, or near the Nodes, and then they are behind the *Sun*, and consequently cannot be seen by a Spectator on our Earth; that is, if their Latitudes be less than the *Sun*'s *Semidiameter*.

Such a Conjunction as this happen'd of the *Sun* and *Mercury*, *Anno* 1693, *October* 29, at 32′ 50″ past Noon in ♏ 16° 52′ 7″, with Latitude 4′ 57″ *S. A.*

This Conjunction, *J. Wing* put in his Almanack for that Year, with the Calculation, to shew the Passage of *Mercury* over the Sun's Disk. Indeed, if he could have jump'd into either *Saturn* or *Venus* at that time, he might then have seen *Mercury* as a black Spot in the Sun: For as *Mercury* was then in *Scorpio*, so were *Saturn* and *Venus* in *Sagittary*; so that an Eye from either of them might have seen *Mercury* in the Sun.

I mention this, only as a Caution to young Students, that they may not fall into the like Error, as he did.

In Page 426, of Vol. I. of my *System*, I have taught how to Calculate a Retrograde Conjunction of *Mercury* or *Venus* over the Sun: But because that differs something from a Direct Conjunction, it will not, I believe, be taken amiss if I shew here how it is to be done.

All the difference is, in finding the Distance of the Planet from the Earth, at the time of the true Conjunction: For as in the Retrograde Conjunction the Angle of the Sun is always 6 Signs; and the Distance of *Mercury* from the Sun is subtracted from the Distance of the Sun from the Earth; so in the Direct Conjunction the Angle at the Sun is nothing: The Distance of *Mercury* from the *Sun* is added to the Distance of the Sun from the Earth; and that Sum is the Distance of *Mercury* from the Earth; (the like in *Venus*.)

To make it more intelligible, take a Synopsis of the Calculation of the Conjunction above mentioned, as it happens from my Tables.

Equal

		d.	h.	′	″
Equal time of true Orbit ☌	1693, *October*	29	0	32	50
Equation of time add	———			15	52
Apparent Time	———	29	0	48	42

	☉ S.	°	′	″	☿ S.	°	′	″
Mean Anomaly of	4	10	44	31	10	22	21	40
Mean Longitude	7	18	21	28	7	4	59	40
Prosthapheresis sub.		1	29	21	+	11	52	27
Orbit Place	7	16	52	7	7	16	52	7
Mercury's North Node sub.	—	—	—	—	1	14	42	12
Argument of Latitude	—	—	—	—	6	2	9	55
Angle at the Sun	0	0	0	0	—	—	—	—
Inclination of the Orb	—	—	—	—		0	15	48

For the Latitude of *Mercury*.

Dist. ☉ à ⊖	98912″	4.995250
Dist. ☿ in his Orbit à ☉ add	45513	4 658138
Dist ☿ à ⊖	144425	5.159642
As Dist. ☿ à ⊖	144425 Co Ar.	4.840358
To Dist. ☿ à ☉	45513	4.658138
So *t*. Inclinat.	0° 15′ 48″	7.662244
To *t*. Geocen. Lat. S.A.	0 4 57	7.160740

That my Reader may have a right Idea of these matters, I will give him another Example of the Conjunction of the Sun with *Venus* Direct, *Anno* 1735, when she will pass below the Sun 45′ 16″. See a Synopsis of the Calculation, and mark it well.

	d.	h.	′	″
Equal time of the true Eclipt. ☌ 1735, *Jan.*	8	21	8	0
Equation of time sub.			11	33
Apparent time — —	8	20	56	27

	☉ S.	°	′	″	♀ S.	°	′	″
Mean Anomaly of	6	20	54	37	11	22	49	49
Mean Longitude	9	29	14	52	9	29	54	16
Prosthapheresis add		0	42	20		0	5	56
Orbit Place	9	29	57	12	10	0	0	11
Venus's North Node	--	--	--	--	2	14	15	58
Argument of Latitude	--	--	--	--	7	15	44	14
Reduction sub.	—	—	—				3	
Ecliptic Place	9	29	0	0	57	11	0	0
Angle at the Sun	0	0	0	0	—	—	—	
Inclination of the Orb	--	--	--	--		2	25	34

For the Latitude of *Venus.*

Dist. ☉ à ◒	98423″	4.993098
Dist. ♀ à ☉ curtat. add	72183	4.858435
Dist. ♀ à ◒	170606	5.231994

As Dist. ♀ à ◒	170606 Co Ar.	4.768006
To Dist. ♀ à ☉	72183	4.858435
So *t.* Inclination	2° 25′ 34″	8.627045
To *t.* Geocen. Lat. S.A.	1 1 37	8.253486
Sum Semidiam. sub.	16 21	
Venus below the Sun	45 16	

Now

Now ſhe ſhews a full Face to the Earth, which I ſhall call 12 Digits (as in the Luminaries;) and all the time from this, to her Retrograde Conjunction with the Sun, the Light will be decreaſing, until ſhe come to her Retrograde Conjunction; and then her dark Hemiſphere being turned towards us, becauſe now ſhe is in a right Line, if the Sun be in her Node, or ſo near it, that her Latitude be leſs than the Sun's Semidiameter at that time, ſhe will appear a black Spot in the *Sun*'s Disk.

And from this Conjunction, to her Direct Conjunction again, ſhe is encreaſing in Light, is horned, biſſected and gibbous, but on the reverſe ſide to what ſhe was before, in going from the Direct to the Retrograde Conjunction.

What I have here ſaid of *Venus*, holds good alſo in *Mercury*. So, by underſtanding well what goes before, it is eaſy at all times to know what Phaſe or Face either of theſe Planets will put on before, or when you look at them: For ſubtract the Sun's Place from the Heliocentric Place of *Venus* or *Mercury*, and if the Diſtance be leſs than 90°, or three Signs; or more than ſix, or leſs than nine, ſay,

As Radius,
To 12 Digits;
So is the Co-Sine of half the Diſtance of the Planet from the Sun,
To the Digits and Decimal Parts of a Digit then light. See the *Scheme* in Page 66.

But if the Diſtance be more than three *Signs*, or leſs than nine, ſay,

As Radius,
To 12 Digits light;
So is the *Sine* of half the Diſtance of the Complement to *6 Signs*,
To the Digits and Decimal Parts light.

A Table of the light Digits of Venus *and* Mercury.

Dist. ♀ & ☿ à ☉ S.	°	Digits light.	Dist. ♀ & ☿ à ☉ S.	°
0	0	12.	0	12
0	10	11.95	20	
0	20	11.83	10	
1	0	11.59	0	11
1	10	11 28	20	
1	20	10.88	10	
2	0	10.39	0	10
2	10	9.85	20	
2	20	9.193	10	
3	0	8.485	0	9
3	10	7.713	20	
3	20	6.883	10	
4	0	6.	0	8
4	10	5.027	20	
4	20	4.104	10	
5	0	3.105	0	7
5	10	2.094	20	
5	20	1.046	10	
6	0	0.	0	6

After

After this manner have I calculated the foregoing Table; which ſhews, that in the firſt *Semicircle* of their Diſtance from the *Sun*, their Digits of Light decreaſe; and in the other *Semicircle*, that is, from 6 to 12 *Signs* of their Diſtance from the *Sun*, the Light increaſeth.

But here it is to be remember'd, that in the firſt *Semicircle* of their Diſtance from the *Sun*, they are Occident, and therefore may be obſerved in the Evening after Sun-ſet.

But if the Diſtance of the Planet be more than 6 *Signs*, then they are Orient, and conſequently muſt be view'd in the Morning before Sun-riſing.

But here we muſt take care that we be not deceiv'd by the general Conſideration of her Phaſes only, ſo as to think that *Venus* will always appear bright and largeſt: For ſuppoſe the Earth at P, and *Venus* at ♀ in the firſt Triangle, Page 66; tho' *Venus* will then ſhine with a full Face; yet ſhe will be then ſo far from the Earth, that her Diſtance from us will more than compenſate for the Quantity of her Light.

Wherefore you may expect to ſee her moſt bright and ſplendid about her greateſt Elongations. See the Figure, Page 47.

And ſince her ſhining, or apparent Light increaſes in a duplicate Ratio; or as the Square of her Diſtance from us diminiſhes, her Light will be much more increaſed by her Approach to the Earth, than it will be leſſen'd by our ſeeing leſs of her illuminated Disk.

So that the Table above ſhews her true Light at ſuch a Diſtance from the *Sun*, but will ſometimes differ from the apparent Light, for the reaſon juſt now given.

Nothing remains now, but to ſhew how to obſerve the Phaſes of *Venus* and *Mercury* with a Teleſcope.

In order hereunto, you muſt be provided with a Teleſcope 14, 16 or 20 Foot, and be ſure that the Glaſſes be well proportion'd to the length of the Tube.

Then you muſt provide an Aperture (which is a Word in Opticks) that is nothing elſe but a piece of fine Gard or Paſtboard cut round, juſt the bigneſs of the Object Glaſs, with a round Hole in its Center, about two tenths of an Inch Diameter, for a Glaſs 14 Foot long. Put this on the Inſide of the Object-Glaſs cloſe to it, when you would obſerve the Phaſes of theſe Planets, and you will have your End anſwer'd.

Note,

Note, The Hole in the Pasteboard, or Aperture, is best made with a round hot Iron; otherwise it will be difficult to make the round.

Thro' this Hole in the Aperture the Image of the Object comes into the Tube, and thence is carry'd to the Eye.

Mr. *Auzout* saith, he found, that the Apertures of Telescopes ought to be nearly in a subduplicate proportion of their Lengths.

This is only a *French* Notion: For what he means, is best known to himself. This I can assure you, that the best way of fitting the Aperture to the Telescope, is by Trial; for a subduplicate Proportion is no more than as 2 to 4, or as 5 to 10, *&c.*

The visible Area of an Object is not increas'd or diminish'd by the greater or lesser Aperture of the Object-Glass: All that is effected thereby, is the admittance of more or less Rays, and consequently the more bright or obscure Appearance of the Object.

When you look at *Venus* thro' a Telescope, you must use a much less Aperture than for the Moon, *Jupiter* or *Saturn*; because her Light is so Vivid and Glaring.

The Table that I have here given, with Practice is the only Guide you can have for proportioning an Aperture to your Telescope: For if the Observation agrees with the Table, according to the Planet's distance at that time from the Sun, then the Aperture and Telescope are rightly proportioned, else not; and so by Trials you must make it bigger or lesser, till you find a Concurrence.

Anno 1734, *Feb.* 28, at 6 Hours *P.M.* I observ'd *Venus* with my 13 $\frac{1}{2}$ Foot Glass, and an Aperture as above describ'd, to have something more than 1 Digit and half Light.

Venus's Heliocentric Place was then 5 Signs, 6° 11″ 58″, and the Sun's Place 11S. 20° 58′ 36″; her Distance from the Sun was 5S. 15° 13′ 22″, which in the Table gives 1.546 Digits light, agreeing exactly with Observation.

The Moon at the same time was in ♊, just past her *Perigeum*, with 5.034 Digits increasing in Light.

To

To be a Compleat Aſtronomer is the greateſt Ornament that it's poſſible Man can be adorned with. Certainly nothing brings him nearer to his Creator, than to contemplate upon the Works of the Great *Jehoavh*. 'Tis indeed an *Herculean* Task to arrive at any tolerable Knowledge of the Fabrick of the Univerſe: But if he finds the ineſtimable Gem, it makes a ſufficient Compenſation for all his Time and Coſt.

To underſtand the Site of the Earth and Sea, and to compute the true Diſtances upon the Terraqueous Globe, is very wonderful, uſeful and pleaſant: But this is nothing to what pleaſure the Heavens afford us; there is room to entertain the Minds of the boldeſt Thinkers: For what can be more ſatisfaction to the Aſtronomer, than to point out the Times and Places in the Heavens of a Conjunction, Eclipſe, Comet, *&c.* and to ſhew on what part of the Globe they ſhall be moſt ſeen, and where not at all!

This, I ſay, is very aſtoniſhing to the Ignorant, and thoſe unlearned in this ſublime Study; but much more to thoſe skill'd in this Science, to ſee how their Lines and Numbers agree with the Inequalities in the Planets Motions; which, by infallible Demonſtration teacheth the Diſtances, Magnitude, Motions, and Appearances of all the Celeſtial Bodies. The truth of all this cannot be made more evident, than by my Schemes of the Appearances of the Satellites of *Jupiter*, which are now publiſhed, and ſold by my ſelf, and by all the Opticians in *London*; where any one that has but an ordinary Teleſcope, may be ſatisfied of the Truth hereof any Evening when *Jupiter* is Viſible; for thereby you will ſee if any of the Circumjovials are wanting, which of them it is, and where it is, whether in the Shadow of *Jupiter*, or between your Eye and his Body.

This is a Work ſo exceeding uſeful, that not any one who uſeth a Teleſcope, ought to be without, and which will be publiſhed Annually, if I meet with Encouragement.

And here I think it will not be taken amiſs, if I mention a Paragraph of Dr. *Pemberton*'s, in the 180th Page of a View of Sir *Iſaac Newton*'s Philoſophy; becauſe it poſſibly doth not fall into every one of my Reader's hands.

" Upon

" Upon this (says he) I think, it is not improper to menti-
" on a Reflection made by our Excellent Author (meaning
" Sir *Isaac Newton*) upon these small Inequalities in the Pla-
" nets Motions; which contains under it a very strong Phi-
" losophical Argument against the Eternity of the World.
" It is this, That these Inequalities of the Planets must con-
" tinually increase by slow Degrees, till they render at
" length the present Frame of Nature unfit for the purposes
" it now serves. And a more convincing proof cannot be
" desir'd, against the present Constitution's having existed
" from Eternity than this, that a certain Period of Years will
" bring it to an End".

I am aware, this Thought of our Author's has been represented even as impious, and as no less than casting a Reflection upon the Wisdom of the Author of Nature, for framing a perishable Work. But I think, so bold an Assertion ought to have been made with singular Caution. For if this Remark upon the increasing Irregularities of the Heavenly Motions be true in Fact, as it really is, the Imputation must return upon the Asserter, that this doth detract from the Divine Wisdom.

Certainly, we cannot pretend to know all the Omniscient Creator's Purposes in making this World; and therefore cannot undertake to determine how long he design'd it should last. And it is sufficient if it endures the time intended by the Author. The Body of every Animal shews the unlimited Wisdom of its Creator no less; nay, in many respects more, than the larger Frame of Nature; and yet we see, they are all design'd to last but a small space of time.

CHAP.

CHAP. XX.

Shewing how to Construct Tables of the Angle Orient, *or Altitude of the Nonagesime Degree of Latitude North or South.*

FIRST, in any Latitude North, if *Aries* or *Libra* Ascend, the Altitude of the Nonagesime Degree, or Angle Orient is gained by adding or subtracting the Obliquity of the Ecliptic to, or from the Complement of the Latitude of the Place, which is ever equal to the Elevation of the Equinoctial.

EXAMPLE.

In the Latitude of one Degree North, what is the Altitude of the Nonagesime Degree, when *Aries* and *Libra* Ascend?

OPERATION.

	°	′
Latitude North 1°, Complement	89	0
Obliquity of the Ecliptic sub. and add	23	29
Angle Orient when *Aries* Ascends	65	31
Sum	112	29
From a Semicircle	180	0
Angle Orient when *Libra* Ascends	67	31

EXAMPLE II.

In the Latitude of 20 Degrees, and *Aries* and *Libra* Ascending, what's the Angle Orient?

OPE-

OPERATION.

	°	'
Latitude 20°, Complement	70	0
Obliquity of the Ecliptic sub. and add	23	29
Angle Orient when *Aries* Ascends	46	31
Sum —	93	18
From a Semicircle	180	0
Angle Orient when *Libra* Ascends	86	31

EXAMPLE III.

In the Latitude of 66° 31′, and *Aries* and *Libra* Ascending, what are the Angles Orient?

OPERATION.

	°	'	
Latitude 66° 31′, Complement	23	29	
Obliquity of the Ecliptic sub. and add	23	29	
Angle Orient when *Aries* Ascends	0	0	X.
Angle Orient when *Libra* Ascends	46	58	Z.

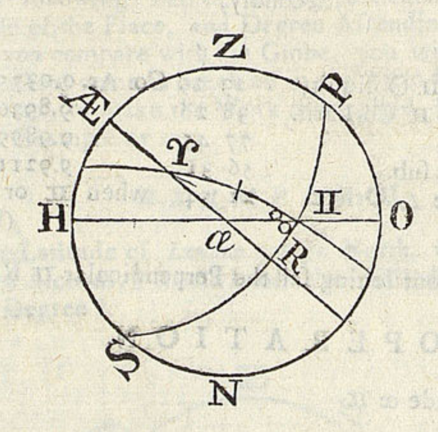
But when any other Degree of the *Ecliptic* Ascends, then it will require the Solution of an Oblique-angled Spheric Triangle; which I shall fully explain in the following Examples.

EXAMPLE I.

In the Latitude of 51° 32′ North, when the first Scruple of ♊ or ♒ Ascends, what is then the Altitude of the Nonagesime Degree?

OPERA-

OPERATION.



In the adjacent Scheme, let the Circle HZON represent the Meridian of the Place, HO the Horizon, ÆR the Equinoctial, ♈ ♊ a part of the *Ecliptic*, being 60 degr. thereof, the Angle œ ♈ ♊, the Obliquity of the *Ecliptic* 23 deg. 29 min. and the Angle ♈ œ ♊ 141 degr. 32 min. the Complement of the Angle H œ Æ 38 degr, 28 min. the Elevation of the Equinoctial in the given Latitude of *London* 51 degr, 32 min. North; to find the Angle ♈ ♊ œ, equal to the Altitude of the Nonagesime Degree, or Angle Orient, which is formed by the *Ecliptic* ♈ ♊, and Horizon HO.

SOLUTION.

First, Let fall the Perpendicular ♊ R to cut the *Equinoctial* in R at Right Angles, and pass thro' its Poles at P and S. Then in the Right-angled Spheric Triangle ♈ R ♊,

	°	′	
As *Ct.* ∠ R ♈ ♊ Obliquity	23	29	10.362044
To Radius —	90	0	10.000000
So *C.S.* ♈ ♊ in the Ecliptic	60	0	9.698970
To *C.t.* ∠ ♈ ♊ R	77	45	9.336926

Secondly

Secondly,

	° ′	
As *C.S.* ∠ R ♈ ♊ Obliquity	23 29	Co. Ar. 0.037547
To *C.S.* ∠ ♈ œ ♊ Co-Latit.	38 28	9.893645
So *S.* ∠ ♈ ♊ R	77 45	9.989997
To *S.* ∠ œ ♊ R ſub.	56 31	9.921189
Rem. ∠ ♈ ♊ œ ∠ Orient	21 54	when ♊ or ♒ Aſcends.

Secondly Without letting fall the Perpendicular ♊ R.

OPERATION.

To find the Side œ ♊.

	° ′	
As *S.* ∠ ♈ œ ♊ Co Latitude	38 28	Co Ar. 0.206168
To *S.* Cr. ♈ ♊ in the Ecliptic	60 0	9.937531
So *S.* ∠ œ ♈ ♊ Obliquity	23 29	9.600409
To *S.* Cr. œ ♊ in the Horizon	33 42	9.744108
Side ♈ ♊	60 0	

	° ′			° ′			° ′
Difference	26 18	Sides	♈ ♊	60 0	∠	♈ œ ♊	141 32
Half	13 9		œ ♊	33 42		œ ♈ ♊	23 29
			Sum	93 42		X	118 3
			Half	46 51		Half	59 1½

Now ſay,

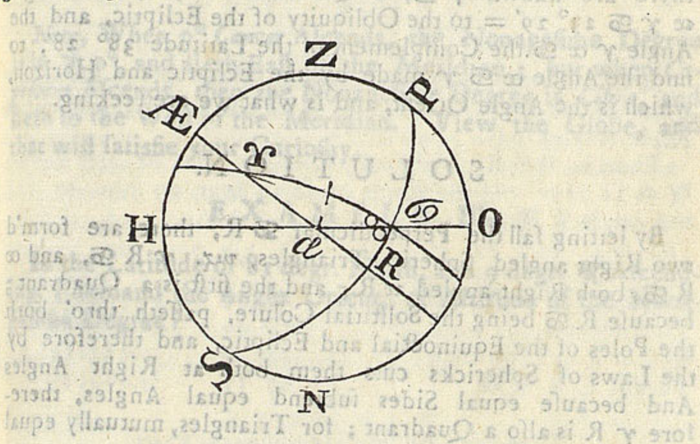
	° ′	
As *S.* half X crs. ♈ ♊ & œ ♊	13 9	Co Ar. 0.643016
To *S.* half Z	46 51	9.863064
So *t.* half X of ∠ ∠	59 1½	10.221513
To *C.t.* half reqd. ∠ ♈ ♊ œ	10 37	10.727593
Doubled, is ∠ ♈ ♊ œ	21 14	Angle Orient, as before.

The ſame method of Solution has been obſerv'd in framing the following Tables, having particular regard to the Latitude of the Place, and Degree Aſcending: Which Tables if you compare with the Globe, you will there ſee how the Numbers come to break off in the Artic Circle, &c.

However, to make the Work more plain, I ſhall here add another Example or two.

EXAMPLE II.

In the Latitude of *London* 51° 32′ North, when *Cancer* or *Capricorn* Aſcends, I would know the Altitude of the Nonageſime Degree?



PROJECTION.

With the Chord of 60 degr. draw the Primitive Circle, which ſhall here repreſent the Meridian of the Place.

Quarter it, and draw HO for the Horizon, Z for the Zenith, and N for the Nadir. Becauſe the Amplitude at *London* in *Cancer* and *Capricorn* is 39 degr. 50 min. take the Semi-Tangent thereof, and ſet it from œ to ♋; then take the Chord of 51 degr. 32 min. and ſet it on the Meridian from O to P, and from H to S; ſo ſhall P be the North Pole, and S the South.

To the three Points P ♋ and S find a Center, and draw the Hour-Circle P ♋ S; make Z Æ = to O P, the Latitude of *London*, and draw Æ œ R for the Equinoctial.

Then because the Oblique Ascension of the Ascendant at *London* is 56 degr. 51 min. when *Cancer* Ascends, from Æ œ a Quadrant = 90 degr. subtract the Oblique Ascension 56 degr. 51 min. from 90 degr. and the Remainder 33 degr. 9 min. is the Distance of ♈ from the Meridian Æ.

Therefore take the Secant of 33 degr. 9 min. and draw the Vertical Circle Z ♈ N; the Oblique Circle P ♋ S is also the Solstitial Colure, and cuts the Ecliptic ♈ ♋ at Right Angles in ♋, and the Equinoctial in Right Angles in R.

Therefore in the Oblique-angled Spheric Triangle ♈ ♋ œ there are known ♈ ♋, a Quadrant or 90°, the Angle œ ♈ ♋ 23° 29′ = to the Obliquity of the Ecliptic, and the Angle ♈ œ ♋ the Complement of the Latitude 38° 28′, to find the Angle œ ♋ ♈ made by the Ecliptic and Horizon, which is the Angle Orient, and is what we are seeking.

SOLUTION.

By letting fall the Perpendicular ♋ R, there are form'd two Right angled Spheric Triangles, *viz.* ♈ R ♋, and œ R ♋, both Right-angled at R; and the first is a Quadrant; because R ♋ being the Solstitial Colure, passeth thro' both the Poles of the Equinoctial and Ecliptic, and therefore by the Laws of Sphericks cuts them both at Right Angles And because equal Sides subtend equal Angles, therefore ♈ R is also a Quadrant; for Triangles, mutually equal in themselves, are also equiangular.

1. To find œ ♋.

	° ′	
As S. ♈ œ ♋ Elevat. Equinoct.	38 28	9.793832
To S. ♈ ♋ Longitude	90 0	10.000000
So S. ∠ œ ♈ ♋ Obliquity	23 29	9.600409
To S. œ ♋ in Horizon = Amplit.	39 50	9.806577

Now,

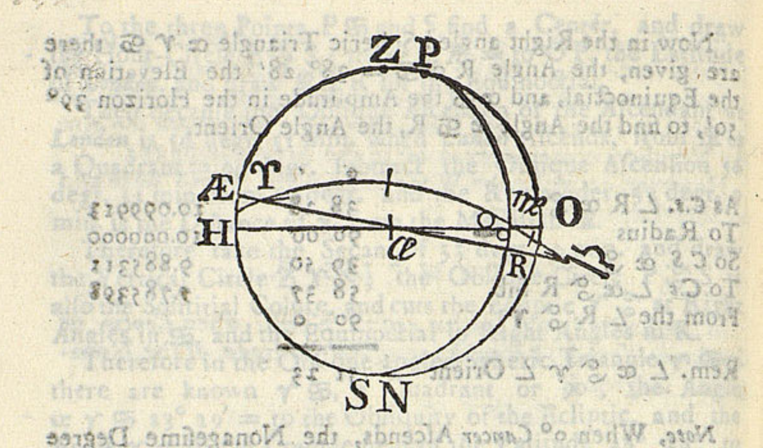
Now in the Right angled Spheric Triangle œ ♈ ♋ there are given, the Angle R œ ♋ = 38° 28′ the Elevation of the Equinoctial, and œ ♋ the Amplitude in the Horizon 39° 50′, to find the Angle œ ♋ R, the Angle Orient.

		° ′	
As C.s. ∠ R œ ♋		38 28	10.099912
To Radius	—	90 00	10.000000
So C S. œ ♋		39 50	9.885311
To C.t. ∠ œ ♋ R sub.		58 37	9.785398
From the ∠ R ♋ ♈		90 0	
Rem. ∠ œ ♋ ♈ ∠ Orient		51 23	

Note, When 0° *Cancer* Ascends, the Nonagesime Degree is in ♈ 0°, and lieth East of the Meridian; but when *Capricorn* Ascends, then the Nonagesime Degree is *Libra*, and lieth to the West of the Meridian. View the Globe, and that will satisfie your Curiosity.

EXAMPLE III.

In the Latitude of 81 degr. North, and 9 degr. ♍ Ascending, I demand the Angle Orient, or Altitude of the Nonagesime Degree?



In this Scheme, in the Triangle œ ♍ ♎, let the Perpendicular be an Hour-Circle P ♍ S, to cut the Equinoctial at Right Angles in R.

Then in the Rect angled Triangle ♍ R ♎ are known ♍ ♎ 21 degr and the Angle at ♎ 23 degr. 29 min. to find the Angle R ♍ ♎.

	° ′	
As *Ct.* ∠ ♍ ♎ R Obliquity	23 29	10 362044
To Radius	90 00	10.000000
So *C S.* ♍ ♎ Longitude	21 0	9.970155
To *C.t.* ∠ R ♍ ♎	67 55	9.680111

Then say, By the Homogeneal Parts,

	° ′		
As *C.S.* ∠ ♍ ♎ R Obliquity	23 29	Co Ar.	0.037547
To *C.S.* ∠ ♍ œ R Co Latit.	9 0		9.994620
So S ∠ R ♍ ♎ last found	67 55		9.966910
To S. ∠ œ ♍ R	86 16		9.999077
Add ∠ R ♍ ♎	67 55		
Z = ∠ œ ♍ ♎ sub.	154 11		
From —	180 0		
Rem. ∠ ♈ ♍ œ ∠ Orient	25 49		

It

It may alſo be ſolved in the Triangle ♈ ♍ œ.

In the Latitude of 66 degr. 31 min. North, and 0° *Cancer* Aſcending (or more properly ſpeaking) Deſcending, the Ecliptic Circle lieth exactly in the Horizon, and conſequently hath no Elevation; as you will ſee, if you look into the Tables of the Angle Orient againſt *Cancer* 0°, and under Latitude 66 degr. 31 min. it is blank; but if you move the Globe Weſtward, until 0° *Libra* Aſcend, the Angle Orient will be then 46 degr. 58 min. which is the double of the Obliquity of the Ecliptic.

From which it is plain, that within the Polar Circles ſome doubtful Caſes will ariſe; becauſe a great part of the Ecliptic doth Aſcend in a Moment of time.

As, for inſtance; In the Altitude of 67 degr. 37 min. North, let *Cancer* 22 degr. 17 min Aſcend, the Angle Orient will be 15 degr. 13 min.; and when *Capricorn* 22 degr. 17 min. Aſcends, the ſame Angle will be 3 degr. 29 min. In the firſt Caſe, the firſt Point of *Cancer* never ſets; and in the latter, the firſt Point of *Capricorn* never riſes.

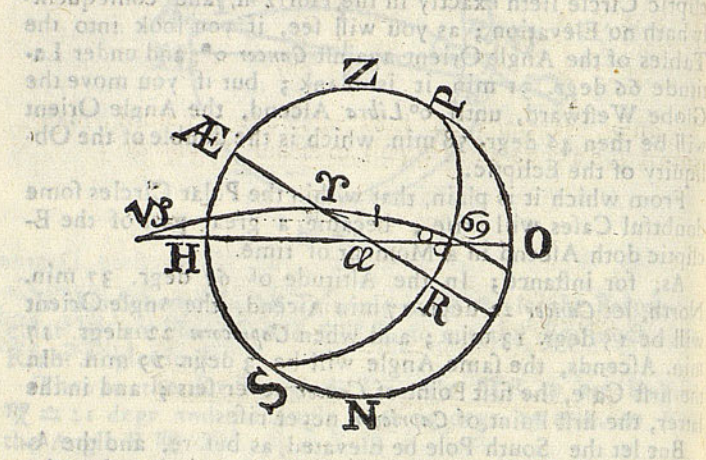
But let the South Pole be Elevated, as before, and the Aſcendant the ſame, *viz.* *Cancer* 22 degr 17 min then the *Angle Orient* is 3 degr. 29 min and *Cancer* never riſes. But if *Capricorn* 22 degr. 17 min. Aſcend, the *Angle Orient* is 15 degr. 13 min. and the firſt Point of *Capricorn* never ſets, as is made more plain in the following Work.

EXAMPLE.

Latitude 67 degr. 37 min. North, Aſcendant *Cancer* 22 degr. 17 min. what's the *Angle Orient*?

OPERATION.

In the Oblique-angled Spheric Triangle ♈ œ ♋, the *Angle* is Obtuse, and therefore doubtful.

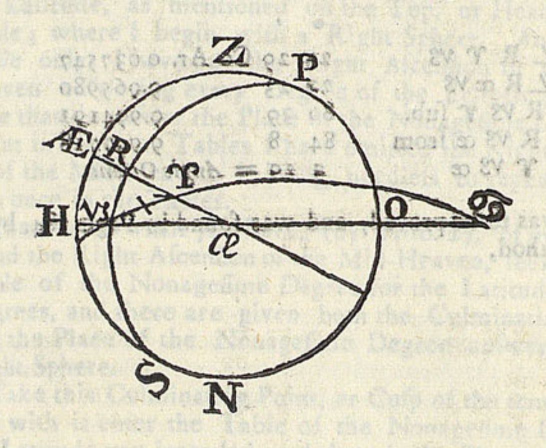


		° ′	
As C.t. ∠ œ ♈ ♋		23 29	10.361044
As Radius		90 00	10.000000
So C S. ♈ ♋		67 43	9.578853
To *C.t.* ∠ ♈ ♋ R		80 39	9.216809
From	—	180 0	
∠ ♈ ♋ R		99 21	

Now say,

As C.S. R ♈ ♋	23	29	Co A. 0.037547
To C.S. ♈ ♋	22	23	9.965980
So S. ♈ ♋ R	80	39	9.994191
To S. œ ♋ R	84	8	9.997718
From ∠ ♈ ♋ R	99	21	
∠ ♈ ♋ œ	15	13	*Angle Orient.*

Secondly, In the same Latitude of 67° 37′ North; let *Capricorn* 22° 17′ Ascend; then what's the *Angle Orient?*



In the Oblique-angled Spherical Triangle ♑ ♈ œ, the *Angle* R ♑ œ is Acute.

OPERATION.

	°	′	
As C.t. ∠ R ♑	23	29	10.362044
To Radius	90	00	10.000000
So C.S. ♑ ♈	67	43	9.578853
To C.t. ∠ R ♑ ♈	80	39	9.216809

Now, if the Perpendicular ♑ R be compared with the *Angles* at ♑ and ♈, and at œ, they will be opposite Extreams

	°	′		
As C.S. ∠ R ♈ ♑	23	29	Co Ar.	0.037547
To *C*.s. ∠ R œ ♑	22	23		9.965980
So S. ∠ R ♑ ♈ sub.	80	39		9.994191
To S. ∠ R ♑ œ from	84	8		9.997718
Rem. ∠ ♈ ♑ œ	3	29	= *Angle Orient*	

Which was to be proved, and was found in Page 184, by my new Method,

CHAP.

CHAP. XXI.

The Explanation and Use of the following Tables.

1. THE Tables of the Nonagesime Degree are made by the 34*th* Problem of my *Compleat System*; by which Tables the Nonagesime Degree may be found to any Time and Latitude, as mentioned on the Top, or Head of each Table; where I begin with a Right Sphere. And in that Table only, I have put the Right Ascension of the Mid-Heaven answering every Degree of the Ecliptic; and to those that do answer the Place of the Nonagesime Degree.

But in the other Tables I have omitted the Right Ascension of the Mid-Heaven, it being needless to repeat it more than once in the Tables.

Therefore, when you have, (by Prob. 27, of my *System*) found the Right Ascension of the Mid-Heaven, seek it in the Table of the Nonagesime Degree for the Latitude of No Degrees, and there are given both the Culminating Point, and the Place of the Nonagesime Degree answering in a Right Sphere.

Take this Culminating Point, or Cusp of the tenth House, and with it enter the Table of the Nonagesime Degree in the Latitude you intended, and there is the Place of the Nonagesime Degree for the Time and Latitude propos'd.

EXAMPLE.

Anno 1731, *July* 10, at 7 in the Evening, in the Latitude of 53 Degrees 22 Minutes North, I demand the Place of the Nonagesime Degree?

		°	′	″
Sun's Place then from my *Tables*	♋	28	20	14
Sun's Right Ascension		120	27	0
Time from Noon		105	0	0
Sum, R. A. *M. Cæli*		225	27	0

Now,

Now, With the Right Aſcenſion of the Mid-Heaven 225 degr. 27 min. enter the firſt Table of the Nonageſime Degree, and there take out the Cuſp of the Tenth anſwering (ever minding to take the proportional Part for the odd Minutes) which I here find to be *Scorpio* 17 degr. 55 min.

With this I enter the Table for the Latitude 53 degr. 22 min. and there it gives me the Place of the Nonageſime Degree *Libra* 9° 31′.

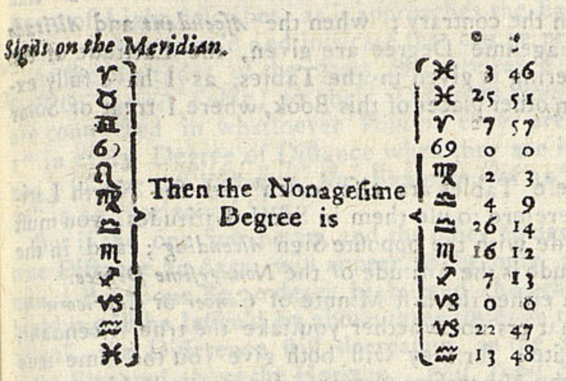
Note, Theſe Tables are calculated for North Latitudes only; but they may be made Univerſal, by entring the Tables with the oppoſite Sign and Degree of the Cuſp of the Tenth, and there are given the oppoſite Sign, Degree and Minutes of the Place of the Nonageſime Degree.

Only obſerve, that when the very beginning of the two Tropical Signs Culminate, that then you muſt not enter the Tables with their Oppoſites, but with thoſe Signs themſelves, and the Degrees anſwering, is the Place of the Nonageſime Degree, as it is titled in the *Tables*.

EXAMPLE.

In the Latitude of 51 Degrees South, I deſire to know the Place of the Nonageſime Degree, when the beginning of every one of the 12 Signs Culminate?

Signs



Here you see when *Aries* Culminates, I enter the Table with *Libra*, and there is given ♍ 3° 46′; but I do not write *Virgo*, but its opposite Sign *Pisces*, and so of the rest, as in the Example above.

Note, The Altitude of the Nonagesime Degree is always equal to the Distance between the Zenith and the Pole of the Ecliptic.

To the Place of the Nonagesime Degree *Libra* 9° 31′ above found, add three Signs, and it makes *Capricorn* 9° 31′ for the Cusp of the Ascendant; with which, and the Latitude of the Place on the Head of the Table of the Angle Orient, is given the Altitude of the Nonagesime Degree.

EXAMPLE.

Let the Ascendant be *Capricorn* 9° 31′ (as above) and the Elevation of the Pole 53° 22′ North. I demand the Altitude of the Nonagesime Degree?

Find the Ascendant in the first Column on the Right Hand, and go streight towards the Left, till you come under the Latitude 53° on the Head, and in the Place of Meeting are given 25° 7′, the Altitude of the Nonagesime Degree.

But because the Tables are Calculated to even Degrees only, you must always mind to make proportion for the odd Minutes, both for the Latitude and Ascendant.

And so on the contrary; when the *Ascendant* and *Altitude* of the Nonagesime Degree are given, the Latitude of the Place answering is given in the Tables, as I have fully exemplify'd in other places of this Book, where I treat of Solar Eclipses.

Note, These Tables are also calculated for North Latitudes. Therefore to use them in South Latitudes, you must enter the Side with the opposite Sign *Ascending*; and in the Given Latitude is the Altitude of the *Nonagesime Degree*.

But when either the first Minute of *Cancer* or *Capricorn* Ascends, it matters not whether you take the true Ascendant, or its Opposite; for they will both give you the same true Altitude of the *Nonagesime Degree*; for in both Cases, the Equinoctial Points are the Places of the *Nonagesime Degree*; consequently, the Altitude of the *Nonagesime* is the same when the *Ascendant* is either *Cancer* or *Capricorn*; because the Equator is unalterable in the same Latitude.

So in the Latitude of 53° South and North, and the *Ascendant Capricorn* or *Cancer*, the Altitude of the *Nonagesime Degree* is 29° 25′; and in the Latitude of 53° North, and *Ascendant Gemini* 0°, the Altitude of the *Nonagesime Degree* is 19° 25′; but the same *Ascendant Gemini* 0° and 53° South Latitude, the Altitude of the *Nonagesime Degree* is 43° 55′; because then I enter the Table with the Opposite *Ascendant*, viz *Sagittary* 0°.

For further satisfaction herein, I refer you to the Construction of the Tables themselves.

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3. The next is a correct Table of Refractions of the Sun, Moon and Stars, calculated by that great Mathematician Sir *Isaac Newton*; (for the Laws of Refractions I refer you to my *System*, under that Word.) He makes the Horizontal Refraction more by 45″ than Mr. *Flamsteed* doth; and the *French* Astronomers make it 1′ less at *Paris*, than he did at *Greenwich*.

But as it falls out to be so little, that none but nice Instruments can perceive its Effects, it was not discover'd to be at all, till *Barnardo Walther*'s time, who was a Native of *Norimberg*, and flourish'd in the Year 1491, Disciple to *Regiomontanus*.

nus. See *Marcus Manilius, Fol.* 43. The Curve which a Beam of Light describes, as it approaches the Earth, is one of the most perplex'd and intricate that can be propos'd.

As the Altitudes of the Stars, &c. are rais'd by the Refraction (as *per* Table) so their Distances from each other are contracted in whatsoever Position they are taken, *viz.* 1″ in every Degree of Distance when they are in the Horizon; so that the Distance, for Example, of 30° loses but 30″ in an Horizontal Site

But if the one Star be 30, and the other 60 degr. high, the true Distance 30 degr. will appear to be only 29 degr. 59 min. But if one be 20 degr. high, and the other 50 degr. high, it will be lessen'd by above three times as much, or by 1′ 41″, the Difference still decreasing, as the Objects are more Elevated above the Horizon. *Phil. Trans.* N°. 368

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4. The Fourth is a Table of the Moon's Parallax in Altitude, which by the Horizontal Parallax on the Head, and the Moon's Altitude in the first Column on the Left hand, and where they meet, is the Moon's Parallax in Altitude at that time, which always makes the Moon's true Altitude so much less, as is her Parallax.

This Table I calculated by *Prob* 38, of my *System.*

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5. The Fifth is a Table of the Moon's Parallax in Longitude and Latitude, which on the Head begins with 1′, and runs to 62′, being the Moon's Horizontal Parallax to serve for this purpose.

And the first Column on the Left hand, is in finding the Parallax in Longitude, the Distance of the Moon from the Nonagesime Degree. But in finding the Parallax in Latitude, the Numbers in the first Column are the Complement of the Altitude of the Nonagesime Degree.

The

The Table is thus made:

Admit the Moon's Horizontal Parallax be 56', and the Altitude of the Nonagesime Degree 30°, what Number in the Table must answer them?

OPERATION.

	°	'		
Moon's Horizontal Parallax LL	0	56	LL	9.970040
Altit of Nonagesime Degree S.	30	0	Sine	9.698970
Answering in the Table	0	28	LL	9 669010

USE.

The Table of the Moon's Parallaxes is of excellent use in determining the Quantity of any Solar Eclipse to any particular Place on the Earth, as I will shew anon.

1. For the Parallax in Longitude.

Enter the Table with the Moon's Horizontal Parallax on the Head, and the Altitude of the Nonagesime Degree in the first Column on the Left hand, and in the common Angle, or Place of meeting, is a Number which I call the *Horizontal Parallax in Longitude*.

Then with the Distance of the Moon from the *Nonagesime Degree* in the first Column on the Left hand, and the Horizontal Parallax of Longitude on the Head, gives the Parallax of the Moon in Longitude.

EXAM.

EXAMPLE.

Let the Horizontal Parallax of the Moon be 56′, the *Altitude* of the *Nonagesime Degree* 30°, and the Distance of the Moon from the *Nonagesime Degree* 72° : What's the Parallax of the Moon in Longitude?

	°	′	
Moon's Horizontal Parallax	0	56	Gives 28′.
Altitude Nonagef. Degree	30	00	

Then,

	°	′	
Horiz. Parall. ☽ in Longitude	0	28	Gives 26′ 38″, the Parallax of the Moon in Longitude.
Dist. ☽ from Nonag. Degree	72	0	

2. For the Parallax of the Moon in Latitude.

Enter the Table on the Head with the Horizontal Parallax of the Moon, and the first Column on the Left hand, with Complement of the *Altitude* of the *Nonagesime Degree* ; and in the Place or meeting is the true Parallax of the Moon in Latitude.

EXAMPLE.

Admit the Horizontal Parallax of the Moon, and the *Altitude* of the *Nonagesime Degree* be as before : What's the Parallax of the Moon in *Altitude*?

	°	′	
Horizontal Parallax of the Moon	0	56	Parallax Latit. 17′ 18″.
Alt. Nonag. Degr. 72°, Complem.	18	0	

Because the Tables are calculated to even Minutes of Horizontal Parallax, and to even Degrees of the *Altitude* of the Nonagesime Degree, &c. when they contain Degrees, Minutes and Seconds, you must mind to make proportion for the Minutes and Seconds, as in the following

EXAM-

EXAMPLE.

	°	′	″
Let the Horizontal Parallax of the ☽ be	0	60	15
Altitude of the Nonagesime Degree	50	33	0
Distance of ☽ from the Nonagesime	34	1	0

What is the Parallax of the Moon in Longitude and Latitude?

OPERATION.

	°	′	″	
Moon's Horizontal Parallax	1	0	15	Gives 46′ 31″
Altitude *Nonagesime Degree*	50	33	0	

Then,

	°	′	″	
Horizontal Parallax ☽'s Longitude	0	46	31	Gives 26′ 1″ Par. Long.
Dist ☽ from *Nonagesime Degree*	34	1	0	

Secondly,

	°	′	″	
Horizontal Parallax of the Moon	1	0	15	Parall. Lat.
Alt Nonagef. 50° 33′ Complem.	39	27	0	38′ 17″

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6. Shewing how to examine the Quantity of any Solar Eclipse in any Place on the Globe.

To the Time of the Visible Conjunction, find the Moon's Horizontal Parallax and True Latitude; which note down.

Then to that Time, and the Given Latitude, find the Nonagesime Degree and its Altitude.

Take the Difference between the Place of the Moon, and the Place of the Nonagesime Degree, and with these find the Moon's Parallax in Latitude.

Apply

Apply this as the Case requires, to the true Latitude of the Moon, and by it you will plainly see the Quantity of the Sun's Eclipse in that Latitude.

EXAMPLE.

Let it be required to find the Quantity of the Sun's Eclipse that happen'd *Anno* 1733, *May* 2, in the Northern Parts of *Scotland*, which lies in the Latitude of 59 Degrees North?

OPERATION.

By a former Calculation of mine the time of the

	d.	h.	′	″
Visible Conjunction at *London* is *May*	2	6	35	39
Difference of Meridians sub.			20	0
Visible ☌ near *Faro Head* in *Scotland*	2	6	15	39
Equation of Time sub.			4	6
Sun's Place then from my Tables	♉	22	52	27
Sun's Right Ascension		50	27	0
Time from Noon add		93	54	45
Sum, is the Right Ascension *M. Cœli*		144	21	45
Cusp of the Tenth	♌	21	59	0
Nonagesime Degr. in Lat. 59° North	♌	4	11	0
Sun's Place sub.	♉	22	52	0
Dist. of ☉ and ☽ from Nonagesime	2	11	19	0
Horizontal Parallax of the Moon		1	0	8
Ascendant	♍	4	11	0
Altitude of the Nonagesime Degree		48	12	0
Complement — —		41	48	0
Parallax of Longitude of the Moon		0	42	27
Parallax of Latitude of the Moon		0	40	5
Moon's true Latitude N. D.		0	43	16
Visible Latitude of the Moon N.D.			3	11
Sum of the Semidiameters of Sun and Moon			32	41
Parts deficient — —			29	30
Digits Eclipsed are on the upper side		11	1	0

Secondly, I would know how the ſame Eclipſe will appear at the Iſland of *Jamaica*?

OPERATION.

		d.	h.	'	"
Viſible Conjunction at *London*,	*May*	2	6	35	39
Difference of Meridians ſub.			5	4	0
Viſible Conjunction at *Jamaica*		2	1	31	39
Sun's true Place then from my Tables		♉	22	52	27
Sun's Right Aſcenſion			50	27	0
Apparent Time from Noon at *Jamaica* add			22	54	45
Right Aſcenſion *M. Cæli*			73	21	45
M. Cæli in the Ecliptic, Cuſp 10th		♊	14	41	0
Nonag. Degree in Latitude 18° North		♊	14	8	0
Sun's Place ſub. — —		♉	22	52	0
Diſt. of Luminaries from Nonag. Degree			21	16	0
Horizontal Parallax of the Moon			1	0	8
Aſcendant — —		♍	14	8	0
Altitude of the Nonageſime Degree			85	26	0
Complement — —			4	34	0
Parallax of Longitude of the Moon				21	44
Parallax of Latitude of the Moon				4	47
Moon's true Latitude N. D.				43	16
Viſible Latitude of the Moon				38	29
Sum of the Semid. of the Sun and Moon				32	41

Hence

Hence, becauſe the Viſible Latitude of the Moon at the time of the Viſible Conjunction of the Sun and Moon exceeds the Sum of their Semidiameters, proves, that there will not be any Eclipſe at all at the Place above-mentioned.

After the ſame manner may the Quantity of any other Solar Eclipſe be nearly determin'd at any Place on the Globe.

But here I muſt remind my Reader, that the times of the Viſible Conjunctions at theſe two Places are not truly found by ſubtracting the Difference of Meridians from the Time of the Viſible Conjunction at *London*, as is there done; becauſe the Parallaxes of the Moon in Longitude (on which the Viſible Conjunction depends) are not the ſame that they are at *London*. But however, this Method is ſufficient to try whether or no an Eclipſe of the Sun will be ſeen at ſuch a Place; and if Viſible, what part of the Sun's Body ſhall be obſcur'd, and (nearly) how much.

Alſo, if you reckon 184 Miles North and South, from the Parallel of *London*, you will nearly have one Digit to be added or ſubtracted to or from the Quantity of the Sun's Eclipſe at *London*, counting 69.5 Miles to one Degree on the Earth's Surface.

Theſe I propoſe as an Eſtimate, and not for perfect Truths; becauſe the Moon's Parallax in Latitude, on which the Quantity of the Sun's Eclipſe depends, is in a continual Flux; and therefore a particular Calculation to any Place is what only is perfect.

CHAP. XXIII.

An Abstract *of an* Act of Parliament, *which Offers a Reward for the Discovery of the Longitude at Sea.*

1. Stat. 12. Annæ, Sess. 2. Chap. 15.

ENacted, That the Lord High Admiral of *England*, or the first Commissioner of the Admiralty, the Speaker of the House of Commons, the first Commissioner of the Navy, the first Commissioner of Trade, the Admirals of the Red, White and Blue Squadrons, the Master of *Trinity-House*, the President of the Royal Society, the Royal Astronomer of *Greenwich*, the *Savilian*, and *Lucasian* Professors of the Mathematicks in *Oxford* and *Cambridge*, all for the time being; the Right Honourable *Thomas* Earl of *Pembroke* and *Montgomery*; *Philip*, Lord Bishop of *Hereford*; *George* Lord Bishop of *Bristol*; *Thomas* Lord *Trevor*; Sir. *Thomas Hanmer*, Baronet, Speaker, &c. *Francis Roberts*, *James Stanhope*, *William Clayton* and *William Lowndes*, Esqrs. shall be Commissioners for discovering the Longitude at Sea, and for examining all Proposals relating to it; and that any five of them may receive Proposals for that purpose, and if they be satisfied of the probability of such Discovery, they shall certifie it to the Commissioners of the Navy, with the Author's Name; and on producing such Certificate, the Commissioners of the Navy shall make Bills for any Sum not exceeding 2000 *l.* as they shall think fit, for making the Experiment, payable by the Treasurer of the Navy, who shall pay it immediately out of any Money unapply'd, for the use of the Navy.

2. After

2. After the Experiment is made, the Commissioners appointed by this Act shall determine how far, and to what Degree of Exactness 'tis practicable.

3. The first Discoverer of a Method for finding the Longitude shall be entituled to a Reward of 10000 *l.* if it determines the same to one Degree of a great Circle, or 60 Geographical Miles; and to 15000 *l.* if it determines the same to two thirds of that distance; and to 20000 *l.* if it determines the same to one half of that Distance; and one half of such Reward shall be paid when the Major part of the Commissioners agree, that such Method extends to the Security of Ships within 80 Geographical Miles of the Shore, which are Places of the greatest Danger; and the other half, when a Ship, by the appointment of the Commissioners, shall Sail over the Ocean from *Great Britain* to any part in the *West-Indies* which they shall nominate for the Experiment, without losing their Longitude beyond the Limits mentioned.

As soon as such Methods shall be tried and found practicable at Sea, within any the Degrees aforesaid, the Commissioners shall Certifie the same to the Commissioners of the Navy, with the Author's Name, and on such Certificate the Commissioners shall make out a Bill for the respective Sums to which the Author shall be entituled, and to be paid by the Treasurer of the Navy.

This *Act* has encouraged many to bend their Thoughts towards the Discovery of the Longitnde at Sea.

The Names of ſuch as are come to hand, with the Times when they publiſh'd their Notions, I rank in their Order, thus:

MR. *Henry Bond*, 1676, By the Magnetical Needle.
Mr. Ed. Harriſon, 1696, Of the ſeveral Methods propos'd.
The Rev. *Mr. Geo. Keith*, 1709, By the Fixed Stars, *Scheder.*
Mr. Francis Cawood, 1712, By Inſtruments, called *Acute Aſtronomer*
Mſſrs. Whiſton and *Ditton*, 1714, By Exploſion.
Mr. John Ward, 1714, By an Automaton.
Mr. William Hall, 1714, By a Watch and the Sun at Riſing.
Mr. Rob. Brown, 1714, By Celeſtial Obſervations, and Watches.
Mr. Steph. Plank, 1720, By the Moon ſeparating from the Fixed Stars.
Mr. Tho. Holder, 1723, By a Nonſenſical Inſtrument.
Mr. Geo. Gorden, 1724, By obſerving the Eclipſes of *Jupiter's* Satellites.
Capt. *Jacob Rowe*, 1725, By an Horometer.
Mr. Jackſon, 1726, By a monſtrous Machine.
The Sailor's Propoſal, 1726, By ☽'s Viſible Declination.
Mr. Rob. Wright, 1728, By ☽'s Place, &c.
Mr. R. Lock, 1730, By the Moon receding from the Sun.
Mr. John Bates, 1730, By Chimæra's in his Brain.
Mr. Whiſton, 1731, By the Dipping Needle.
Mr. Eli. Pledger, 1731, By a fluid Quadrant Latitude.
Mr. Benj Parker, 1731, By the Moon's Southing.
Mr. John Gueſt, 1731, By an Armillary Sphere.
Mr. Rob. Wright, 1732, By the Moon's Place.

A

A Table *of the Digits and Decimal Parts of the Moon's Light, to every Hour of the first Day after her Change, and from thence to every Day of her Age.*

☽'s Age H.	Digits light.	Moon's Age Days d.	h.	Digits light.	Moon's Age Days. d.	h.	Digits light.
1	.0338983	0	0	— — — —	29	12	— — —
2	.0677966	1		0.8135592	29		0.4367814
3	.1016949	2		1.6271184	28		1.2203406
4	.1355932	3		2.4406776	27		2.0338998
5	.1694915	4		3.2542368	26		2.8474590
6	.2033898	5		4 0677960	25		3.6610882
7	.2372881	6		4.8813352	24		4.4745774
8	.2711864	7		5.6949144	23		5.2881366
9	.3050847	8		6.5014736	22		6.1016958
10	.3389830	9		7.3220328	21		6.9152550
11	.3728813	10		8.1355920	20		7.7288142
12	.4067796	11		8.9491512	19		8.5123734
13	.4406779	12		9.7627104	18		9.3559328
14	.4745762	13		10.5762696	17		10.1694918
15	.5084745	14		11.3898288	16		10.9830510
16	.5423728						
17	.5762711	14	18	12. — — —	15		11.7966102
18	.6101694						
19	.6440677						
20	.6779660						
21	.7118643						
22	.7457626						
23	.7796609						
24	.8135592						

A Table of the Time that the two Pointers in the Great Bear will be upon the Meridian above the Pole.

Days	January h.	'	February. h.	'	March. h.	'
1	3 M	9	1 M	0	11 A.	15
2	3	5	12 A	56	11	12
3	3	1	12	53	11	8
4	2	56	12	49	11	5
5	2	52	12	46	11	1
6	2	48	12	42	10	57
7	2	44	12	38	10	54
8	2	39	12	34	10	50
9	2	34	12	30	10	46
10	2	30	12	27	10	43
11	2	26	12	23	10	39
12	2	21	12	19	10	36
13	2	17	12	15	10	32
14	2	13	12	11	10	28
15	2	9	12	8	10	25
16	2	5	12	4	10	21
17	2	1	12	0	10	17
18	1	57	11	56	10	14
19	1	53	11	53	10	10
20	1	49	11	49	10	7
21	1	45	11	45	10	3
22	1	41	11	41	9	59
23	1	37	11	38	9	56
24	1	33	11	34	9	52
25	1	28	11	30	9	48
26	1	24	11	27	9	45
25	1	20	11	23	9	41
28	1	16	11	19	9	37
29	1	12	—	—	9	34
30	1	8	—	—	9	30
31	1	4	—	—	9	26

The Table of the time when the two Pointers in the Great Bear will be upon the Meridian above the Pole, continued.

Days	April. h.	'	May. h.	'	June. h.	'
1	9 A.	25	7 A.	31	5 A.	26
2	9	21	7	27	5	22
3	9	17	7	23	5	18
4	9	14	7	20	5	13
5	9	10	7	16	5	9
6	9	6	7	12	5	5
7	9	3	7	8	5	1
8	8	59	7	4	4	57
9	8	55	7	0	4	53
10	8	51	6	56	4	49
11	8	48	6	52	4	44
12	8	44	6	48	4	40
13	8	40	6	44	4	36
14	8	36	6	40	4	32
15	8	33	6	36	4	28
16	8	29	6	32	4	24
17	8	25	6	28	4	19
18	8	21	6	23	4	15
19	8	18	6	19	4	11
20	8	14	6	15	4	7
21	8	10	6	11	4	3
22	8	6	6	7	3	59
23	8	2	6	3	3	55
24	7	58	5	59	3	51
25	7	55	5	55	3	46
26	7	51	5	51	3	42
27	7	47	5	47	3	38
28	7	43	5	42	3	34
29	7	39	5	38	3	30
30	7	35	5	34	3	26
31	—	—	5	30	—	—

☞ In Page 312, the Time is 2' too little.

The Table *of the time when the two Pointers in the Great Bear will be upon the Meridian above the Pole, continued.*

Days	July. h.	'	August. h.	'	Sept. h.	'	Oct. h.	'	Nov. h.	'	Dec. h.	'
1	3 A.	22	1 A.	20	11 M	26	9 M	38	7 M	37	5 M	29
2	3	18	1	16	11	23	9	34	7	33	5	25
3	3	14	1	12	11	19	9	30	7	29	5	20
4	3	10	1	9	11	15	9	26	7	25	5	16
5	3	6	1	5	11	12	9	23	7	21	5	12
6	3	2	1	1	11	8	9	19	7	17	5	7
7	2	58	0	57	11	5	9	15	7	13	5	3
8	2	54	0	54	11	1	9	11	7	9	4	58
9	2	50	0	50	10	57	9	8	7	4	4	54
10	2	46	0	46	10	54	9	4	7	0	4	49
11	2	42	0	42	10	50	9	0	6	56	4	45
12	2	39	0	39	10	47	8	56	6	52	4	41
13	2	35	0	35	10	43	8	52	6	47	4	36
14	2	31	0	32	10	39	8	49	6	43	4	32
15	2	27	0	28	10	36	8	45	6	39	4	27
16	2	22	0	24	10	32	8	41	6	35	4	23
17	2	18	0	21	10	29	8	37	6	30	4	18
18	2	14	0	17	10	25	8	33	6	26	4	14
19	2	10	0	13	10	21	8	29	6	22	4	09
20	2	6	0	10	10	18	8	25	6	17	4	5
21	2	2	0	6	10	14	8	21	6	13	4	1
22	1	58	0	2	10	11	8	17	6	9	3	56
23	1	54	11 M	59	10	7	8	14	6	4	3	52
24	1	51	11	55	10	5	8	10	6	0	3	47
25	1	47	11	51	10	0	8	6	5	56	3	43
26	1	43	11	48	9	56	8	2	5	51	3	39
27	1	39	11	44	9	52	7	58	5	47	3	34
28	1	35	11	41	9	49	7	54	5	43	3	30
29	1	31	11	37	9	45	7	50	5	38	3	25
30	1	28	11	33	9	41	7	46	5	34	3	21
31	1	24	11	30	—	—	7	41	—	—	3	17

A Table of the time when the First Pointer in the Little Bear comes to the Meridian above the Pole.

Days	Jan. h.	′	Febr. h.	′	Mar. h.	′	April h.	′	May h.	′	June. h.	′
1	7 M	14	5 M	6	3 M	20	1 M	28	11 M	34	9 A	29
2	7	10	5	2	3	17	1	24	11	30	9	25
3	7	6	4	59	3	13	1	20	11	26	9	21
4	7	1	4	55	3	10	1	17	11	23	9	16
5	6	57	4	51	3	6	1	13	11	19	9	12
6	6	53	4	47	3	1	1	9	11	15	9	8
7	6	49	4	43	2	59	1	6	11	11	9	4
8	6	44	4	39	2	55	1	2	11	7	9	0
9	6	40	4	35	2	51	12 A	58	11	3	8	56
10	6	36	4	32	2	48	12	54	10	59	8	52
11	6	32	4	21	2	44	12	51	10	55	8	47
12	6	28	4	24	2	41	12	47	10	51	8	43
13	6	23	4	20	2	37	12	43	10	47	8	39
14	6	19	4	16	2	33	12	39	10	43	8	35
15	6	15	4	13	2	30	12	36	10	39	8	31
16	6	11	4	9	2	26	12	32	10	35	8	27
17	6	7	4	5	2	22	12	28	10	31	8	22
18	6	3	4	1	2	19	12	24	10	26	8	18
19	5	58	3	58	2	15	12	21	10	22	8	14
20	5	54	3	54	2	12	12	17	10	18	8	10
21	5	50	3	50	2	8	12	13	10	14	8	6
22	5	46	3	46	2	4	12	9	10	10	8	2
23	5	42	3	43	2	1	12	5	10	6	7	58
24	5	38	3	39	1	57	12	1	10	2	7	54
25	5	34	3	35	1	53	11	58	9	58	7	49
26	5	30	3	32	1	50	11	54	9	54	7	45
27	5	26	3	28	1	46	11	50	9	50	7	41
28	5	22	3	24	1	42	11	46	9	45	7	37
29	5	18	—	—	1	39	11	42	9	41	7	33
30	5	14	—	—	1	35	11	38	9	37	7	29
31	5	10	—	—	1	31	—	—	9	33	—	—

The Table *of the time when the First Pointer in the Little Bear comes to the South.*

Days	July. h.	′	August. h.	′	Sept. h.	′	Octob. h.	′	Novem. h.	′	Decemb. h.	′
1	7	A.25	5	A.23	3	A.29	1	A. 41	11	M.40	9	M. 32
2	7	21	5	19	3	26	1	37	11	36	9	28
3	7	17	5	15	3	22	1	33	11	32	9	23
4	7	13	5	12	3	18	1	29	11	28	9	19
5	7	9	5	8	3	15	1	26	11	24	9	15
6	7	5	5	4	3	11	1	22	11	20	9	10
7	7	1	5	0	3	8	1	18	11	16	9	6
8	6	57	4	57	3	4	1	14	11	12	9	1
9	6	53	4	53	3	0	1	11	11	7	8	57
10	6	49	4	49	2	57	1	7	11	3	8	52
11	6	45	4	46	2	53	1	3	10	59	8	48
12	6	41	4	42	2	50	0	59	10	55	8	44
13	6	37	4	38	2	49	0	55	10	50	8	39
14	6	33	4	35	2	42	0	52	10	46	8	35
15	6	29	4	31	2	39	0	48	10	42	8	30
16	6	25	4	27	2	35	0	44	10	38	8	26
17	6	21	4	24	2	32	0	40	10	33	8	21
18	6	17	4	20	2	28	0	36	10	29	8	17
19	6	13	4	16	2	24	0	32	10	25	8	12
20	6	9	4	13	2	21	0	28	10	20	8	8
21	6	5	4	9	2	17	0	24	10	16	8	4
22	6	1	4	5	2	14	0	21	10	12	7	59
23	5	57	4	2	2	10	0	17	10	7	7	55
24	5	54	3	58	2	6	0	13	10	3	7	50
25	5	50	3	54	2	3	0	9	9	59	7	46
26	5	46	3	51	1	59	0	5	9	54	7	42
27	5	42	3	47	1	55	0	1	9	50	7	37
28	5	38	3	44	1	52	11	M57	9	46	7	33
29	5	34	3	40	1	48	11	53	9	41	7	28
30	5	31	3	36	1	44	11	49	9	37	7	24
31	5	27	3	33			11	44			7	20

The

A
T A B L E
OF THE
Nonagesime Degree,

To the Obliquity of the Ecliptic 23 Degrees, 29 Minutes, from the Equator to 60 Degrees of North and South Latitude.

A Table *of the Nonagesime Degree, to the Obliquity of the Ecliptic* 23° 29′ *and Latitude* 0°.

Cusp 10. *Aries.* °	R. Ascen. *M. Cæli.* °	′	Nonagesime. °		′
0	0	0	0	♈	0
1	0	55	0		51
2	1	50	1		42
3	2	45	2		32
4	3	40	3		22
5	4	35	4		12
6	5	30	5		3
7	6	26	5		54
8	7	21	6		44
9	8	16	7		35
10	9	11	8		26
11	10	6½	9		17
12	11	2	10		8
13	11	57	10		59
14	12	53	11		50
15	13	48	12		42
16	14	44	13		33
17	15	40	14		25
18	16	36	15		16
19	17	32	16		8
20	18	28	17		1
21	19	24	17		53
22	20	20	18		46
23	21	16	19		38
24	22	13	20		31
25	23	9	21		14
26	24	6	22		17
27	25	3	23		11
28	26	0	24		5
29	26	57	24		59
30	27	54	25		54

The

The Table *of the Nonagesime Degree, to the Obliquity of the Ecliptic* 23° 29′, *and Latitude* 0°, *continu'd.*

Cusp 10. *Taurus.* °	R. Ascen. M. *Cæli.* °	′	Nonage-sime. °		′
0	27	54	25	♈	54
1	28	52	26		48
2	29	49	27		43
3	30	47	28		38
4	31	45	29		34
5	32	43	0	♉	29
6	33	41	1		25
7	34	39	2		21
8	35	37	3		18
9	36	36	4		15
10	37	35	5		12
11	38	34	6		10
12	39	33	7		8
13	40	32	8		6
14	41	32	9		4
15	42	32	10		3
16	43	31	11		2
17	44	31	12		2
18	45	32	13		2
19	46	32	14		2
20	47	33	15		3
21	48	33½	16		4
22	49	34	17		5
23	50	36	18		7
24	51	37	19		10
25	52	38	20		14
26	53	40	21		16
27	54	42	22		19
28	55	44	23		23
29	56	46	24		27
30	57	49	25		31

The

The Table *of the Nonagesime Degree, to the Obliquity of the Ecliptic* 23° 29′, *and Latitude* 0°, *continu'd.*

Cusp 10. *Gemini.* ° ′	R. Ascen. *M. Cœli.* °	′	Nonagesime. °		′
0	57	49	25	♉	31
1	58	51	26		35
2	59	54	26		40
3	60	57	28		46
4	62	0	29		52
5	63	3	0	♊	59
6	64	6	2		9
7	65	10	3		13
8	66	14	4		20
9	67	17	5		28
10	68	21	6		35
11	69	25	7		43
12	70	30	8		52
13	71	34	10		1
14	72	38	11		11
15	73	43	12		20
16	74	48	13		29
17	75	52	14		39
18	76	57	15		49
19	78	2	16		59
20	79	7	18		9
21	80	12	19		20
22	81	17	20		31
23	82	22	21		42
24	83	28	22		52
25	84	33	24		3
26	85	38	25		14
27	86	44	26		26
28	87	49	27		37
29	88	55	28		49
30	90	0	0	♋	0

The Table *of the Nonagesime Degree, to the Obliquity of the Ecliptic* 23° 29′, *and Latitude* 0°, *continu'd.*

Cusp 10. Cancer. °	R. Ascen. M. Cœli. °	′	Nonagesime. °		′
0	90	0	0	♋	0
1	92	5	1		11
2	92	11	2		23
3	93	16	3		34
4	94	22	4		46
5	95	27	5		57
6	96	32	7		8
7	97	38	8		18
8	98	43	9		29
9	99	48	10		40
10	100	53	11		51
11	101	58	13		1
12	103	3	14		11
13	104	8	15		21
14	105	12	16		31
15	106	17	17		40
16	107	22	18		49
17	108	26	19		59
18	109	30	21		8
19	110	35	22		17
20	111	39	13		25
21	112	43	24		33
22	113	46	25		40
23	114	50	26		47
24	115	54	27		54
25	116	57	29		1
26	118	0	0	♌	3
27	119	3	1		13
28	120	6	2		19
29	121	9	3		24
30	122	11	4		29

The Table of the Nonagesime Degree, to the Obliquity of the Ecliptic 23° 39′, *and* 0° *Latitude.*

Cusp 10. *Leo.* °	R. Ascen. *M. Cœli* °	′	Nonagesime. °		′
0	122	11	4	♌	29
1	123	14	5		33
2	124	16	6		37
3	125	18	7		41
4	126	20	8		44
5	127	22	9		47
6	128	23	10		50
7	129	24	11		53
8	130	26	12		55
9	131	26½	13		56
10	132	27	14		57
11	133	28	15		58
12	134	28	16		58
13	135	29	17		58
14	136	29	18		58
15	137	28	19		57
16	138	28	20		56
17	139	28	21		54
18	140	27	22		52
19	141	26	23		50
20	142	25	24		48
21	143	24	25		45
22	144	23	26		42
23	145	21	27		39
24	146	19	28		35
25	147	17	29		31
26	148	15	0	♍	26
27	149	13	1		22
28	150	11	2		17
29	151	8	3		12
30	152	6	4		6

The

A Table *of the Nonagesime Degree, to the Obliquity of the Ecliptic* 23°. 29′, *and Latitude* 0°, *continu'd.*

Cusp 10. *Virgo.* °	R. Ascen. *M. Cæli.* °	′	Nonagesime. °		′
0	152	6	4	♍	6
1	153	3	5		1
2	154	0	5		55
3	154	57	6		49
4	155	54	7		42
5	156	51	8		26
6	157	47	9		29
7	158	44	10		22
8	159	40	11		14
9	160	36	12		7
10	161	32	12		59
11	162	28	13		52
12	163	24	14		44
13	164	20	15		35
14	165	16	16		27
15	166	12	17		18
16	167	7	18		10
17	168	3	19		1
18	168	58	19		52
19	169	53½	20		43
20	170	49	21		34
21	171	44	22		25
22	172	39	23		16
23	173	34	24		7
24	174	30	24		57
25	175	25	25		48
26	176	20	26		38
27	177	15	27		28
28	178	10	28		18
29	179	5	29		9
30	180	0	0	♎	0

The Table *of the Nonagesime Degree, to the Obliquity of the Ecliptic* 23° 29′, *and Latitude* 0°, *continu'd.*

Cusp 10. *Libra.* °	R. Ascen. *M. Cæli.* °	′	Nonagesime. °		′
0	180	0	0	♎	0
1	180	55	0		51
2	181	50	1		42
3	182	45	2		32
4	183	40	3		22
5	184	35	4		13
6	165	30	5		3
7	186	26	5		54
8	187	21	6		44
9	188	16	7		35
10	189	11	8		26
11	190	6½	9		17
12	191	2	10		8
13	191	57	10		59
14	192	51	11		50
15	193	48	12		42
16	194	44	13		33
17	195	40	14		25
18	196	36	15		16
19	197	32	16		8
20	198	28	17		1
21	199	24	17		53
22	200	20	18		46
23	201	16	19		38
24	202	13	20		31
25	203	9	21		24
26	204	6	22		17
27	205	3	23		11
28	206	0	24		5
29	207	57	24		59
30	208	54	25		54

A Table *of the Nonagesime Degree, to the Obliquity of the Ecliptic* 23° 29′. *and Latitude* 0°, *continued.*

Cusp 10. *Scorpio.* °	R. Ascen. *M. Cœli.* °	′	Nonagesime. °		′
0	207	54	25	♎	54
1	208	52	26		48
2	209	49	27		43
3	210	47	28		38
4	211	45	29		34
5	212	43	0	♏	29
6	213	41	1		25
7	214	39	2		21
8	215	37	3		18
9	216	36	4		15
10	217	35	5		12
11	218	34	6		10
12	219	33	7		8
13	220	32	8		6
14	221	32	9		4
15	222	32	10		3
16	223	31	11		2
17	224	31	12		2
18	225	32	13		2
19	226	32	14		2
20	227	33	15		3
21	228	33½	16		4
22	229	34	17		5
23	230	36	18		7
24	231	37	19		10
25	232	38	20		13
26	233	40	21		16
27	234	42	22		19
28	235	44	23		23
29	236	46	24		27
30	237	49	25		31

The

The Table *of the Nonagesime Degree, to the Obliquity of the Ecliptic* 23° 29′, *and Latitude* 0°, *continu'd.*

Cusp 10. *Sagittary* °	R. Ascen. *M. Cæli.* °	′	Nonagesime. °		′
0	237	49	25	♏	31
1	238	51	26		35
2	239	54	27		40
3	240	57	28		46
4	242	0	29		52
5	243	3	0	♐	59
6	244	6	2		6
7	245	10	3		13
8	246	14	4		20
9	247	17	5		28
10	248	21	6		35
11	249	25	7		43
12	250	30	8		52
13	251	34	10		1
14	252	38	11		11
15	253	43	12		20
16	254	48	13		29
17	255	52	14		39
18	256	57	15		49
19	258	2	16		59
20	259	7	18		9
21	260	12	19		20
22	261	17	20		31
23	262	22½	21		42
24	263	28	22		52
25	264	33	24		3
26	265	38	25		14
27	266	44	26		26
28	267	49	27		37
29	268	55	28		49
30	270	0	0	♑	0

The Table *of the Nonagesime Degree, to the Obliquity of the Ecliptic* 23° 29′, *and Latitude* 0°, *continu'd.*

Cusp 10. *Capricorn.* °	R. Ascen. M. *Cæli.* °	′	Nonage-sime. °		′
0	270	0	0	♑	0
1	271	5	1		11
2	272	11	2		23
3	273	16	3		34
4	274	22	4		46
5	275	27	5		57
6	276	32	7		8
7	277	38	8		18
8	278	43	9		29
9	279	48	10		40
10	280	53	11		51
11	281	58	13		1
12	283	3	14		11
13	284	8	15		21
14	285	12	16		31
15	286	17	17		40
16	287	22	18		49
17	288	26	19		59
18	289	30	21		8
19	290	35	22		17
20	291	39	23		25
21	292	43	24		33
22	293	46	25		40
23	294	50	26		47
24	295	54	27		54
25	296	57	29		1
26	298	0	0	♒	7
27	299	3	1		13
28	300	6	2		19
29	301	9	3		24
30	302	11	4		29

The Table *of the Nonagesime Degee, to the Obliquity of the Ecliptic,* 23° 29′, *and Latitude* 0°.

Cusp 10. *Aquarius* °	R. Ascen. M. *Cæli.* °	′	Nonagesime. °		′
0	302	11	4	♒	29
1	303	14	5		33
2	304	16	6		37
3	305	18	7		41
4	306	20	8		44
5	307	22	9		47
6	308	23	10		50
7	309	24	11		53
8	310	26	12		55
9	311	26½	13		56
10	312	27	14		57
11	313	28	15		58
12	314	28	16		58
13	315	29	17		58
14	316	29	18		58
15	317	28	19		57
16	318	28	20		56
17	319	28	21		54
18	320	27	22		52
19	321	26	23		50
20	322	25	24		48
21	323	24	25		45
22	324	23	26		42
23	325	21	27		39
24	326	19	28		35
25	327	17	29		31
26	328	15	0	♓	26
27	329	13	1		22
28	330	11	2		17
29	331	8	3		12
30	332	6	4		6

The Table of the *Nonagesime Degree, to the Obliquity of the Ecliptic* 23° 29′, *and Latitude* 0°, *continued.*

Cusp 10. *Pisces.* °	R. Ascen. *M. Cæli.* °	′	Nonagesime. °		′
0	332	6	4	♓	6
1	333	3	5		1
2	334	0	5		55
3	334	57	6		49
4	335	54	7		43
5	336	51	8		36
6	337	47	9		29
7	338	44	10		22
8	339	40	11		14
9	340	36	12		7
10	341	32	12		59
11	342	28	13		52
12	343	24	14		44
13	344	20	15		35
14	345	16	16		27
15	346	12	17		19
16	347	7	18		10
17	348	3	19		1
18	348	58	19		52
19	349	53½	20		43
20	350	49	21		34
21	351	44	22		25
22	352	39	23		16
23	353	34	24		6
24	354	30	24		57
25	355	25	25		47
26	356	20	26		37
27	357	15	27		28
28	358	10	28		18
29	359	5	29		9
30	360	0	0		0

A Table *of the Nonagesime Degree, to the Latitude of* 4 *Degrees.*

Cusp 10. *Aries.* °	Nona-gesime. °	′	Cusp 10 *Taurus.* °	Nona-gesime. °	′
0	1 ♈	36	0	27 ♈	20
1	2	28	1	28	14
2	3	18	2	29	8
3	4	13	3	0 ♉	2
4	4	58	4	0	57
5	5	48	5	1	52
6	6	39	6	2	47
7	7	30	7	3	43
8	8	20	8	4	38
9	9	10	9	5	34
10	10	1	10	6	31
11	10	52	11	7	28
12	11	42	12	8	24
13	12	33	13	9	22
14	13	24	14	10	20
15	14	16	15	11	18
16	15	7	16	12	16
17	15	58	17	13	15
18	16	49	18	14	13
19	17	40	19	15	12
20	18	33	20	16	12
21	19	25	21	17	12
22	20	16	22	18	12
23	21	7	23	19	12
24	22	0	24	20	14
25	22	53	25	21	15
26	23	45	26	22	17
27	24	39	27	23	19
28	25	32	28	24	21
29	26	26	29	25	25
30	27	20	30	26	26

The Table *of the Nonagesime Degree, for the Latitude of 4 Degrees, continu'd.*

Cusp 10. *Gemini.* °	Nonagesime. °	′	Cusp 10. *Cancer.* °	Nonagesime. °	′
0	26 ♉	26	0	0 ♋	0
1	27	29	1	1	9
2	28	33	2	2	19
3	29	37	3	3	28
4	0 ♊	42	4	4	38
5	1	47	5	5	47
6	2	52	6	6	56
7	3	58	7	8	4
8	5	3	8	9	13
9	6	9	9	10	22
10	7	15	10	11	31
11	8	21	11	12	39
12	9	28	12	13	47
13	10	35	13	14	55
14	11	42	14	16	3
15	12	49	15	17	11
16	13	56	16	18	18
17	15	5	17	19	26
18	16	13	18	20	33
19	17	21	19	21	40
20	18	29	20	22	46
21	19	38	21	23	51
22	20	47	22	24	58
23	21	56	23	26	3
24	23	5	24	27	9
25	24	14	25	28	14
26	25	23	26	29	18
27	26	31	27	0 ♌	24
28	27	42	28	1	27
29	28	51	29	2	30
30	0 ♋	0	30	3	34

The Table *of the Nonagesime Degree, for the Latitude of 4 Degrees, continued.*

Cusp 10. *Leo.* °	Nona-gesime. °	′	Cusp 10. *Virgo.* °	Nona-gesime. °	′
0	3 ♌	34	0	2 ♍	40
1	4	37	1	3	35
2	5	40	2	4	28
3	6	42	3	5	21
4	7	44	4	6	14
5	8	45	5	7	7
6	9	47	6	8	0
7	10	48	7	8	52
8	11	49	8	9	44
9	12	49	9	10	36
10	13	48	10	11	28
11	14	48	11	12	20
12	15	47	12	13	12
13	16	46	13	14	3
14	17	44	14	14	54
15	18	43	15	15	45
16	19	41	16	16	36
17	20	39	17	17	27
18	21	36	18	18	18
19	22	33	19	19	9
20	23	30	20	19	59
21	24	26	21	20	50
22	25	22	22	21	41
23	26	18	23	22	31
24	27	14	24	23	21
25	28	9	25	24	12
26	29	3	26	25	2
27	29	58	27	25	52
28	0 ♍	53	28	26	42
29	1	47	29	27	33
30	2	40	30	28	23

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A Table of the *Nonagesime Degree, for the Latitude of 4 Degrees.*

Cusp 10. *Libra.* °	Nona-gesime. ° '		Cusp 10. *Scorpio.* °	Nona-gesime. ° '	
0	28 ♍	23	0	24 ♎	23
1	29	14	1	25	18
2	0 ♎	4	2	26	14
3	0	55	3	27	9
4	1	45	4	28	6
5	2	36	5	29	2
6	3	27	6	29	58
7	4	17	7	0 ♏	55
8	5	8	8	1	52
9	5	59	9	2	50
10	6	50	10	3	48
11	7	41	11	4	46
12	8	32	12	5	44
13	9	23	13	6	44
14	10	14	14	7	43
15	11	6	15	8	43
16	11	56	16	9	43
17	12	50	17	10	44
18	13	42	18	11	45
19	14	34	19	12	46
20	15	27	20	13	49
21	16	19	21	14	51
22	17	12	22	15	55
23	18	5	23	16	58
24	18	58	24	18	1
25	19	52	25	19	5
26	20	45	26	20	9
27	21	39	27	21	14
28	22	34	28	22	19
29	23	28	29	23	25
30	24	23	30	24	31

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The Table *of the Nonageſime Degree for the Latitude of 4 Degrees, continued.*

Cuſp 10. *Sagittary* °	Nona-geſime. °	′	Cnſp 10. *Capricorn* °	Nona-geſime. °	°
0	24♏	31	0	0 ♑	0
1	25	36	1	1	13
2	26	42	2	2	27
3	27	50	3	3	41
4	28	57	4	4	35
5	29♐	6	5	6	9
6	1	14	6	7	21
7	2	20	7	8	35
8	3	32	8	9	48
9	4	42	9	11	1
10	5	51	10	12	14
11	7	1	11	13	27
12	9	11	12	14	39
13	10	23	13	15	51
14	11	34	14	17	2
15	12	45	15	18	4
16	13	57	16	19	26
17	14	9	17	20	38
18	15	22	18	21	49
19	16	34	19	23	0
20	17	46	20	24	9
21	19	59	21	25	19
22	20	12	22	26	26
23	21	25	23	27	37
24	22	38	24	28	46
25	23	52	25	29	54
26	25	5	26	1 ♒	2
27	26	19	27	2	10
28	27	33	28	3	18
29	28	47	29	4	24
30	0 ♑	0	30	5	32

The

The Table *of the Nonagesime Degree for the Latitude of* 4 *Degrees, continued.*

Cusp 10. *Aquarius* °	Nonagesime. °	′	Cusp 10. *Pisces.* °	Nonagesime. °	′
0	5 ♒	32	0	5 ♓	37
1	6	36	1	6	32
2	7	42	2	7	27
3	8	47	3	8	21
4	9	51	4	9	15
5	10	55	5	10	08
6	12	0	6	11	2
7	13	4	7	11	56
8	14	7	8	12	48
9	15	9	9	13	41
10	16	11	10	14	33
11	17	13	11	15	27
12	18	14	12	16	19
13	19	16	13	17	10
14	20	17	14	18	3
15	21	17	15	18	55
16	22	17	16	19	46
17	23	16	17	20	38
18	24	15	18	21	29
19	25	14	19	22	21
20	26	12	20	23	11
21	27	10	21	24	2
22	28	8	22	24	53
23	29	6	23	25	43
24	0 ♓	3	24	26	34
25	0	59	25	27	24
26	1	56	26	28	15
27	2	52	27	29	5
28	3	47	28	29	56
29	4	42	29	0 ♈	46
30	5	37	30	1	36

A Table *of the Nonagesime Degree, for the Latitude of* 8 *Degrees.*

Cusp 10. *Aries.* °	Nonagesime. °	′	Cusp 10. *Taurus.* °	Nonagesime. °	′
0	3 ♈	11	0	28 ♈	46
1	4	4	1	29	39
2	4	54	2	0 ♉	33
3	5	44	3	1	26
4	6	35	4	2	20
5	7	25	5	3	14
6	8	15	6	4	8
7	9	5	7	5	3
8	9	55	8	5	58
9	10	45	9	6	53
10	11	36	10	7	49
11	12	26	11	8	45
12	13	16	12	9	41
13	14	7	13	10	38
14	14	58	14	11	35
15	15	49	15	12	32
16	16	40	16	13	30
17	17	30	17	14	27
18	18	21	18	15	24
19	19	12	19	16	22
20	20	4	20	17	20
21	20	55	21	18	19
22	21	46	22	19	18
23	22	37	23	20	17
24	23	29	24	21	17
25	24	22	25	22	17
26	25	14	26	23	17
27	26	7	27	24	17
28	26	59	28	25	18
29	27	52	29	26	19
30	28	46	30	27	20

The Table *of the* N*onagesime Degree, for the Latitude of* 8 *Degrees, continu'd.*

Cusp 10. *Gemini.* °	Nona-gesime. °	′	Cusp 10. *Cancer.* °	Nona-gesime. °	′
0	27 ♉	21	0	0 ♋	0
1	28	23	1	1	8
2	29	25	2	2	15
3	0 ♊	28	3	3	21
4	1	31	4	4	29
5	2	35	5	5	36
6	3	38	6	6	43
7	4	42	7	7	50
8	5	46	8	8	57
9	6	50	9	10	3
10	7	54	10	11	10
11	8	58	11	12	17
12	10	3	12	13	23
13	11	8	13	14	29
14	12	13	14	15	35
15	13	18	15	16	41
16	14	24	16	17	47
17	15	30	17	18	52
18	16	36	18	19	52
19	17	42	19	21	2
20	18	49	20	22	7
21	19	56	21	13	11
22	21	3	22	24	15
23	22	10	23	25	19
24	23	17	24	26	23
25	24	24	25	27	26
26	25	31	26	28	29
27	26	36	27	29	32
28	27	46	28	0 ♌	34
29	28	53	29	1	36
30	0 ♋	0	30	2	39

The Table *of the Nonagesime Degree, for the Latitude of 8 Degrees, continu'd.*

Cusp 10. *Leo.* °	Nona-gesime. °	′	Cusp 10. *Virgo.* °	Nona-gesime. °	′
0	2 ♌	39	0	1 ♍	14
1	3	41	1	2	8
2	4	42	2	3	1
3	5	43	3	3	53
4	6	43	4	4	46
5	7	43	5	5	38
6	8	43	6	6	30
7	9	43	7	7	22
8	10	42	8	8	14
9	11	41	9	9	5
10	12	40	10	9	57
11	13	38	11	10	48
12	14	36	12	11	39
13	15	33	13	12	30
14	16	30	14	13	20
15	17	28	15	14	11
16	18	25	16	15	2
17	19	22	17	15	53
18	20	19	18	16	43
19	21	15	19	17	34
20	22	11	20	18	24
21	23	6	21	19	14
22	24	2	22	20	5
23	24	57	23	20	55
24	25	52	24	21	45
25	26	46	25	22	35
26	27	40	26	23	25
27	28	54	27	24	15
28	29	38	28	25	6
29	0 ♍	21	29	25	56
30	1	14	30	26	46

The Table of the *Nonagesime Degree for the Latitude of* 8 *Degrees, continued.*

Cusp 10. *Libra.* °	Nona-gesime. °	′	Cusp 10. *Scorpio.* °	Nona-gesime. °	′
0	26 ♍	46	0	22 ♎	53
1	27	37	1	23	48
2	28	27	2	24	44
3	29	18	3	25	40
4	0 ♎	8	4	26	37
5	0	59	5	27	34
6	1	50	6	28	31
7	2	40	7	29	29
8	3	31	8	2 ♏	26
9	4	22	9	1	24
10	5	13	10	2	23
11	6	4	11	3	22
12	6	55	12	4	22
13	7	46	13	5	22
14	8	38	14	6	22
15	9	30	15	7	23
16	10	22	16	8	24
17	11	15	17	9	26
18	12	7	18	10	28
19	12	59	19	11	31
20	13	52	20	12	34
21	14	45	21	13	38
22	15	48	22	14	43
23	16	31	23	15	48
24	17	25	24	16	52
25	18	19	25	17	57
26	19	13	26	19	2
27	20	7	27	20	8
28	21	2	28	21	15
29	21	57	29	22	22
30	22	53	30	23	29

The Table *of the Nonagesime Degree, for the Latitude of* 8 *Degrees, continu'd.*

Cusp 10. *Sagittary* °	Nonagesime. °	'	Cusp 10. *Capricorn* °	Nonagesime. °	'
0	23 ♏	29	0	0 ♑	0
1	24	36	1	1	16
2	25	44	2	2	32
3	26	53	3	3	48
4	28	2	4	5	4
5	29	12	5	6	20
6	0 ♐	22	6	7	36
7	1	33	7	8	52
8	2	44	8	10	7
9	3	56	9	11	22
10	5	7	10	12	37
11	6	19	11	13	52
12	7	31	12	15	6
13	8	44	13	16	20
14	9	57	14	17	35
15	11	10	15	18	49
16	12	24	16	20	3
17	10	39	17	21	17
18	14	54	18	22	30
19	16	8	19	23	42
20	17	23	20	24	53
21	18	38	21	26	5
22	19	53	22	27	16
23	21	8	23	28	27
24	22	24	24	29	37
25	23	40	25	0 ♒	47
26	24	56	26	1	57
27	26	12	27	8	7
28	27	28	28	4	16
29	28	44	29	5	24
30	0 ♑	0	30	6	32

The Table *of the Nonagesime Degree, for the Latitude of* 8 *Degrees, continued.*

Cusp 10. *Aquarius* °	Nona-gesime. °		Cusp 10. *Pisces.* °	Nona-gesime. °	′
0	6 ♒	32	0	7 ♓	7
1	7	39	1	8	3
2	8	46	2	8	58
3	9	52	3	9	53
4	10	58	4	10	47
5	12	3	5	11	41
6	13	9	6	12	35
7	14	14	7	13	29
8	15	18	8	14	22
9	16	22	9	15	15
10	17	25	10	16	8
11	18	28	11	17	1
12	19	31	12	17	53
13	20	33	13	18	45
14	21	35	14	19	38
15	22	36	15	20	30
16	23	37	16	21	22
17	24	37	17	22	14
18	25	37	18	23	5
19	26	37	19	23	56
20	27	36	20	24	47
21	28	35	21	25	38
22	29	34	22	26	29
23	0 ♓	33	23	27	20
24	1	31	24	28	11
25	2	28	25	29	1
26	3	25	26	29	52
27	4	21	27	0 ♈	42
28	5	16	28	1	33
29	7	12	29	2	23
30	7	7	30	3	11

A Table of *the Nonagesime Degree, for the Latitude of* 12 *Degrees.*

Cusp 10. *Aries.* °	Nona-gesime. °	′	Cusp 10. *Taurus.* °	Nona-gesime. °	′
0	4 ♈	50	0	0 ♉	11
1	5	44	1	1	3
2	6	33	2	1	56
3	7	23	3	2	49
4	8	13	4	3	42
5	9	1	5	4	34
6	9	51	6	5	28
7	10	41	7	6	22
8	11	33	8	7	17
9	12	22	9	8	11
10	13	13	10	9	6
11	14	2	11	10	0
12	14	52	12	10	55
13	15	42	13	11	51
14	16	33	14	12	47
15	17	23	15	13	43
16	18	13	16	14	39
17	19	3	17	15	35
18	19	54	18	16	31
19	20	44	19	17	28
20	21	35	20	18	25
21	22	26	21	19	22
22	23	17	22	20	20
23	24	7	23	21	19
24	24	59	24	22	17
25	25	51	25	23	16
26	26	42	26	24	15
27	27	34	27	25	14
28	28	26	28	26	14
29	29	18	29	27	14
30	0 ♉	11	30	28	14

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The Table of the Nonagesime Degree, for the Latitude of 12 Degrees, continued.

Cusp 10. Gemini. °	Nonagesime. °	′	Cusp 10. Cancer. °	Nonagesime. °	′
0	28 ♉	14	0	0 ♋	0
1	29	14	1	1	6
2	0 ♊	15	2	2	12
3	1	16	3	3	17
4	2	17	4	4	22
5	3	19	5	5	27
6	4	21	6	6	33
7	5	23	7	7	37
8	6	25	8	8	42
9	7	28	9	9	45
10	8	30	10	10	52
11	9	33	11	11	58
12	10	36	12	13	1
13	11	39	13	14	5
14	12	43	14	15	10
15	13	46	15	16	14
16	14	50	16	17	18
17	15	55	17	18	21
18	16	59	18	19	24
19	18	3	19	20	27
20	19	8	20	21	30
21	20	13	21	22	33
22	21	18	22	23	35
23	22	23	23	24	38
24	23	28	24	25	40
25	24	34	25	26	42
26	25	39	26	27	42
27	26	43	27	28	44
28	27	52	28	29	45
29	28	55	29	0 ♌	46
30	0 ♋	0	30	1	47

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The Table *of the Nonagesime Degree, for the Latitude of* 12 *Degrees, continu'd.*

Cusp 10. *Leo.* °	Nonagesime. °	'	Cusp 10. *Virgo.* °	Nonagesime. °	'
0	1 ♌	47	0	29 ♌	50
1	2	46	1	0 ♍	43
2	3	46	2	1	35
3	4	46	3	2	26
4	5	45	4	3	18
5	6	44	5	4	10
6	7	43	6	5	1
7	8	41	7	6	52
8	9	39	8	7	43
9	10	37	9	8	34
10	11	35	10	8	25
11	12	32	11	9	16
12	13	29	12	10	8
13	14	26	13	11	58
14	15	22	14	11	47
15	16	18	15	12	38
16	17	14	16	13	28
17	18	9	17	14	18
18	19	5	18	15	8
19	20	0	19	15	58
20	20	54	20	16	48
21	21	49	21	17	38
22	22	43	22	18	28
23	23	37	23	19	18
24	24	32	24	20	7
25	25	25	25	20	57
26	26	19	26	21	47
27	27	12	27	22	37
28	28	5	28	23	27
29	28	57	29	24	17
30	29	50	30	25	7

The Table *of the Nonagesime Degree, for the Latitude of* 12 *Degrees, continued.*

Cusp 10. *Libra.* °	Nonagesime. °	′	Cusp 10. *Scorpio.* °	Nonagesime. °	′
0	25 ♍	7	0	21 ♎	14
1	25	57	1	22	9
2	26	47	2	23	6
3	27	37	3	24	2
4	28	28	4	25	0
5	29	19	5	25	57
6	0 ♎	9	6	26	55
7	0	59	7	27	53
8	1	50	8	28	51
9	2	41	9	29	50
10	3	32	10	0 ♏	50
11	4	23	11	1	50
12	5	15	12	2	51
13	6	6	13	3	51
14	6	57	14	4	53
15	7	49	15	5	54
16	8	41	16	6	56
17	9	33	17	7	59
18	10	25	18	9	2
19	11	18	19	10	6
20	12	11	20	11	10
21	13	4	21	12	15
22	13	57	22	13	20
23	14	51	23	14	26
24	15	45	24	15	32
25	10	40	25	16	39
26	17	33	26	17	45
27	18	28	27	18	53
28	19	23	28	20	1
29	20	18	29	21	9
30	21	14	30	22	18

The Table *of the Nonagesime Degree for the Latitude of* 12 *Degrees, continued.*

Cusp 10. *Sagittary* °	Nonagesime. °	′	Cusp 10. *Capricorn* °	Nonagesime. °	′
0	22 ♏	18	0	0 ♑	0
1	23	27	1	1	18
2	24	37	2	2	38
3	25	48	3	3	57
4	26	59	4	5	15
5	28	11	5	6	34
6	29	23	6	7	52
7	0 ♐	36	7	9	10
8	1	49	8	10	28
9	3	3	9	11	46
10	4	18	10	13	4
11	5	31	11	14	22
12	6	45	12	15	38
13	8	0	13	16	55
14	9	15	14	18	12
15	10	31	15	19	29
16	11	48	16	20	45
17	13	5	17	22	1
18	14	22	18	23	14
19	15	39	19	24	31
20	16	57	20	25	45
21	18	15	21	26	59
22	19	32	22	28	12
23	20	50	23	29	25
24	22	9	24	0 ♒	36
25	23	27	25	1	49
26	24	41	26	3	1
27	26	4	27	4	12
28	27	22	28	5	23
29	28	41	29	6	33
30	0 ♑	0	30	7	44

The Table *of the* Nonagesime *Degree for the* Latitude *of* 12 *Degrees, continued.*

Cusp 10. *Aquarius* °	Nonagesime. °	′	Cusp 10. *Pisces.* °	Nonagesime. °	′
0	7 ♒	44	0	8 ♓	47
1	8	15	1	9	43
2	10	0	2	10	38
3	11	7	3	11	33
4	12	15	4	12	27
5	13	22	5	13	22
6	14	29	6	14	16
7	15	36	7	15	10
8	16	40	8	16	4
9	17	45	9	16	57
10	18	49	10	17	50
11	19	54	11	18	43
12	20	58	12	19	35
13	22	1	13	20	27
14	23	4	14	21	20
15	24	8	15	22	12
16	25	7	16	23	3
17	26	8	17	23	55
18	27	11	18	24	46
19	28	13	19	25	37
20	29	9	20	26	28
21	0 ♓	9	21	27	19
22	1	9	22	28	10
23	2	8	23	29	1
24	3	6	24	29	51
25	4	4	25	0 ♈	42
26	5	2	26	1	33
27	5	59	27	2	23
28	6	55	28	3	13
29	7	51	29	4	5
30	8	47	30	4	50

A Table *of the Nonagesime Degree, to the Latitude of* 16 *Degrees.*

Cusp 10. *Aries.* °	Nonagesime. °	′	Cusp 10. *Taurus.* °	Nonagesime. °	′
0	6 ♈	33	0	1 ♉	35
1	7	23	1	2	27
2	8	12	2	3	19
3	9	2	3	4	11
4	9	51	4	5	3
5	10	41	5	5	55
6	11	31	6	6	48
7	12	20	7	7	41
8	13	20	8	8	35
9	13	59	9	9	28
10	14	49	10	10	22
11	15	38	11	11	15
12	16	28	12	12	9
13	17	17	13	13	3
14	18	7	14	13	58
15	18	57	15	14	53
16	19	46	16	15	48
17	20	36	17	16	43
18	21	26	18	17	38
19	22	16	19	18	33
20	23	6	20	19	29
21	23	56	21	20	25
22	24	47	22	21	22
23	25	37	23	22	20
24	26	28	24	23	17
25	27	19	25	24	15
26	28	10	26	25	13
27	28	1	27	26	11
28	29	52	28	27	9
29	0 ♉	43	29	28	8
30	1	35	30	29	6

The Table *of the Nonagesime Degree, for the* Latitude *of* 16 *Degrees, continu'd.*

Cusp 10. *Gemini.* °	Nona-gesime. °	′	Cusp 10. *Cancer.* °	Nona-gesime. °	′
0	29 ♉	6	0	0 ♋	0
1	0 ♊	5	1	1	4
2	1	4	2	2	8
3	2	3	3	3	11
4	3	3	4	4	15
5	4	3	5	5	18
6	5	3	6	6	21
7	6	4	7	7	24
8	7	4	8	8	27
9	8	5	9	9	30
10	9	6	10	10	33
11	10	7	11	11	36
12	11	9	12	12	39
13	12	10	13	13	41
14	13	12	14	14	44
15	14	14	15	15	46
16	15	16	16	16	48
17	16	19	17	17	50
18	17	21	18	18	51
19	18	24	19	19	52
20	19	27	20	20	53
21	20	30	21	21	54
22	21	33	22	22	55
23	22	36	23	23	56
24	23	39	24	24	56
25	24	43	25	25	57
26	25	46	26	26	57
27	26	49	27	27	56
28	27	52	28	28	56
29	28	56	29	29	55
30	0 ♋	0	30	0 ♌	54

The Table *of the Nonagesime Degree, for the Latitude of 16 Degrees, continued.*

Cusp 10. *Leo.* °	Nona-gesime. °	′	Cusp 10. *Virgo.* °	Nona-gesime. °	′
0	0 ♌	54	0	28 ♌	25
1	1	52	1	29	17
2	2	50	2	0 ♍	8
3	3	48	3	0	59
4	4	46	4	1	50
5	5	54	5	2	41
6	6	42	6	3	31
7	7	39	7	4	22
8	8	36	8	5	12
9	9	33	9	6	3
10	10	29	10	6	53
11	11	26	11	7	43
12	12	22	12	8	33
13	13	18	13	9	24
14	14	13	14	10	14
15	15	8	15	11	4
16	16	2	16	11	54
17	16	56	17	12	43
18	17	50	18	13	33
19	18	44	19	14	22
20	19	37	20	15	12
21	20	31	21	16	1
22	21	24	22	16	51
23	22	17	23	17	40
24	23	11	24	18	29
25	24	4	25	19	19
26	24	57	26	20	9
27	25	49	27	20	58
28	26	41	28	21	47
29	27	33	29	22	37
30	28	25	30	23	27

The Table *of the Nonagesime Degree, for the Latitude of* 16 *Degrees, continued.*

Cusp 10. *Libra.* °	Nonagesime. °	'	Cusp 10. *Scorpio.* °	Nonagesime. °	'
0	23♍	27	0	19♎	34
1	24	17	1	20	30
2	25	7	2	21	27
3	25	57	3	22	24
4	26	47	4	23	22
5	27	38	5	24	20
6	28	28	6	25	18
7	29	18	7	26	17
8	0 ♎	9	8	27	16
9	1	0	9	28	16
10	1	51	10	29	17
11	2	42	11	0 ♏	18
12	3	34	12	1	19
13	4	25	13	2	21
14	5	16	14	3	23
15	6	7	15	4	25
16	6	59	16	5	28
17	7	51	17	6	31
18	8	43	18	7	35
19	9	36	19	8	40
20	10	29	20	9	45
21	11	22	21	10	51
22	12	15	22	11	57
23	13	9	23	13	4
24	14	3	24	14	12
25	14	58	25	15	10
26	15	53	26	16	28
27	16	48	27	17	37
28	17	43	28	18	46
29	18	38	29	19	56
30	19	34	30	21	7

The Table *of the Nonagesime Degree, for the Latitude of 16 Degrees, continued.*

Cusp 10. *Sagittary* ° ′	Nonagesime. ° ′		Cusp 10. *Capricorn* °	Nonagesime. ° ′	
0	21 ♏	7	0	0 ♑	0
1	22	18	1	1	21
2	23	30	2	2	45
3	24	43	3	4	5
4	25	56	4	5	26
5	27	10	5	6	47
6	28	14	6	8	8
7	29	39	7	9	28
8	0 ♐	54	8	10	49
9	2	10	9	12	10
10	3	26	10	13	31
11	4	42	11	14	51
12	5	58	12	16	10
13	7	15	13	17	30
14	8	33	14	18	49
15	9	52	15	20	8
16	11	11	16	21	27
17	12	30	17	22	45
18	13	50	18	24	2
19	15	10	19	25	19
20	16	30	20	26	36
21	17	51	21	27	52
22	19	11	22	29	7
23	20	32	23	0 ♒	22
24	21	53	24	1	36
25	23	13	25	2	50
26	24	34	26	4	4
27	25	55	27	5	17
28	27	16	28	6	30
29	28	58	29	7	42
30	0 ♑	0	30	8	53

The Table *of the Nonagesime Degree, for the Latitude of 16 Degrees, continu'd.*

Cusp 10. *Aquarius* °	Nonagesime. °	′	Cusp 10. *Pisces.* °	Nonagesime. °	′
0	8 ♒	53	0	10 ♓	26
1	10	5	1	11	22
2	11	13	2	12	17
3	12	22	3	13	12
4	13	31	4	14	7
5	14	40	5	15	2
6	15	48	6	15	56
7	16	55	7	16	51
8	18	2	8	17	45
9	19	8	9	18	39
10	20	14	10	19	32
11	21	19	11	20	25
12	22	24	12	21	17
13	23	28	13	22	9
14	24	31	14	23	1
15	25	34	15	23	53
16	26	37	16	24	44
17	27	39	17	25	36
18	28	41	18	26	27
19	29	42	19	27	18
20	0 ♓	42	20	28	9
21	1	43	21	29	0
22	2	43	22	29	51
23	3	42	23	0 ♈	42
24	4	41	24	1	32
25	5	40	25	2	22
26	6	38	26	3	13
27	7	36	27	4	3
28	8	33	28	4	53
29	9	30	29	5	43
30	10	26	30	6	33

A Table *of the Nonagesime Degree, for the Latitude of* 20 *Degrees.*

Cusp 10. *Aries.*	Nonagesime		Cusp 10. *Taurus.*	Nonagesime.	
°	°	'	°	°	'
0	8 ♈	19	0	3 ♉	2
1	9	11	1	3	53
2	9	57	2	4	44
3	10	47	3	5	35
4	11	36	4	6	27
5	12	25	5	7	18
6	13	14	6	8	10
7	14	3	7	9	1
8	14	52	8	9	54
9	15	41	9	10	46
10	16	30	10	11	38
11	17	19	11	12	30
12	18	8	12	13	23
13	18	57	13	14	16
14	19	46	14	15	10
15	20	35	15	16	4
16	21	24	16	16	58
17	22	13	17	17	52
18	23	3	18	18	46
19	24	52	19	19	40
20	24	41	20	20	34
21	25	31	21	21	30
22	26	21	22	22	25
23	27	10	23	23	21
24	28	0	24	24	17
25	28	50	25	25	13
26	29	40	26	26	9
27	0 ♉	31	27	27	6
28	1	21	28	28	3
29	2	11	29	29	0
30	3	2	30	29	57

The Table *of the Nonagesime Degree, for the Latitude of* 20 *Degrees, continued.*

Cusp 10. *Gemini* °	Nonagesime. °	′	Cusp 10. *Cancer.* °	Nonagesime. °	′
0	29 ♉	57	0	0 ♋	0
1	0 ♊	55	1	1	2
2	1	52	2	2	4
3	2	50	3	3	6
4	3	48	4	4	8
5	4	47	5	5	9
6	5	45	6	6	10
7	6	44	7	7	12
8	7	43	8	8	13
9	8	42	9	9	14
10	9	42	10	10	15
11	10	41	11	11	16
12	11	41	12	12	17
13	12	41	13	13	18
14	13	41	14	14	19
15	14	41	15	15	19
16	15	42	16	16	19
17	16	42	17	17	19
18	17	43	18	18	19
19	18	44	19	19	19
20	19	45	20	20	18
21	20	47	21	21	18
22	21	48	22	22	17
23	22	49	23	23	17
24	23	50	24	24	15
25	24	52	25	25	14
26	25	53	26	26	13
27	26	55	27	27	10
28	27	56	28	28	8
29	28	58	29	29	6
30	0 ♋	0	30	0 ♌	3

The Table *of the Nonagesime Degree, for the Latitude of* 20 *Degrees, continu'd.*

Cusp 10. *Leo.* °	Nonagesime. °	′	Cusp 10. *Virgo.* °	Nonagesime. °	′
0	0 ♌	3	0	27 ♌	0
1	1	0	1	27	51
2	1	57	2	28	40
3	2	54	3	29	30
4	3	50	4	0 ♍	20
5	4	45	5	1	10
6	5	43	6	2	0
7	6	39	7	2	50
8	7	34	8	3	39
9	8	30	9	4	29
10	9	24	10	5	19
11	10	20	11	6	8
12	11	14	12	6	57
13	12	9	13	7	47
14	13	3	14	8	37
15	13	57	15	9	26
16	14	50	16	10	15
17	15	43	17	11	4
18	16	36	18	11	52
19	17	29	19	12	41
20	18	22	20	13	30
21	19	14	21	14	19
22	20	6	22	15	8
23	20	58	23	15	57
24	21	51	24	16	46
25	22	43	25	17	35
26	23	34	26	18	24
27	24	26	27	19	13
28	25	17	28	20	2
29	26	8	29	20	52
30	27	0	30	21	41

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The Table *of the Nonagesime Degree, for the Latitude of 20 Degrees, continu'd.*

Cusp 10. *Libra.* °	Nonagesime. °	′	Cusp 10. *Scorpio.* °	Nonagesime. °	′
0	21 ♍	41	0	17 ♎	3
1	22	31	1	18	39
2	23	20	2	19	36
3	24	10	3	20	34
4	25	1	4	21	32
5	25	50	5	22	30
6	26	39	6	23	29
7	27	29	7	24	28
8	28	20	8	25	27
9	29	10	9	26	28
10	0 ♎	1	10	27	30
11	0	51	11	28	31
12	1	43	12	29	33
13	2	34	13	0 ♏	35
14	3	25	14	1	38
15	4	16	15	2	41
16	5	7	16	3	44
17	5	59	17	4	48
18	6	51	18	5	53
19	7	44	19	6	59
20	8	37	20	8	5
21	9	30	21	9	12
22	10	23	22	10	20
23	11	17	23	11	28
24	12	11	24	12	38
25	13	6	25	13	47
26	14	1	26	14	57
27	14	56	27	16	8
28	15	51	28	17	19
29	16	47	29	18	30
30	17	43	30	19	43

The Table *of the Nonagesime Degree, for the Latitude of* 20 *Degrees, continu'd.*

Cusp 10. *Sagittary* °	Nona-gesime. ° ′		Cusp 10. *Capricorn* °	Nona-gesime. ° ′	
0	19 ♏	43	0	0 ♑	0
1	20	56	1	1	25
2	22	10	2	2	51
3	23	24	3	4	16
4	24	32	4	5	41
5	25	55	5	7	5
6	27	11	6	8	29
7	28	28	7	9	53
8	29	46	8	11	17
9	1 ♐	4	9	12	41
10	2	22	10	14	2
11	3	41	11	15	29
12	5	1	12	16	51
13	6	21	13	18	14
14	7	42	14	19	36
15	9	3	15	20	58
16	10	25	16	22	19
17	11	47	17	23	40
18	13	10	18	25	0
19	14	33	19	26	19
20	15	56	20	27	39
21	17	20	21	28	57
22	18	44	22	0 ♒	15
23	20	8	23	1	33
24	21	32	24	2	49
25	22	56	25	4	5
26	24	20	26	5	21
27	25	45	27	6	36
28	27	10	28	7	51
29	28	35	29	9	5
30	0 ♑	0	30	10	18

The Table *of the Nonagesime Degree, for the Latitude of 20 Degrees, continued.*

Cusp 10. *Aquarius* °	Nonagesime. °	'	Cusp 10. *Pisces.* °	Nonagesime. °	'
0	10 ♒	18	0	12 ♓	18
1	11	30	1	13	14
2	12	41	2	14	9
3	13	53	3	15	5
4	15	3	4	16	0
5	16	13	5	16	55
6	17	22	6	17	49
7	18	31	7	18	43
8	19	39	8	19	37
9	20	46	9	20	31
10	21	53	10	21	24
11	23	0	11	22	17
12	24	6	12	23	9
13	25	11	13	24	1
14	26	16	14	24	53
15	27	20	15	25	45
16	28	23	16	26	36
17	29	26	17	27	27
18	0 ♓	28	18	28	18
19	1	30	19	29	9
20	2	31	20	0 ♈	0
21	3	32	21	0	50
22	4	32	22	1	41
23	5	31	23	2	31
24	6	30	24	3	21
25	7	30	25	4	11
26	8	28	26	5	1
27	9	27	27	5	51
28	10	24	28	6	40
29	11	21	29	7	30
30	12	18	30	8	19

A Table *of the Nonagesime Degree, for the Latitude of* 24 *Degrees.*

Cusp 10. *Aries.* °	Nonagesime. °	′	Cusp 10. *Taurus.* °	Nonagesime. °	′
0	10 ♈	5	0	4 ♉	28
1	10	54	1	5	18
2	11	42	2	6	9
3	12	31	3	6	59
4	13	20	4	7	50
5	14	8	5	8	40
6	14	57	6	9	31
7	15	45	7	10	21
8	16	34	8	11	12
9	17	22	9	12	3
10	18	11	10	12	54
11	18	59	11	13	45
12	19	48	12	14	37
13	20	36	13	15	29
14	21	25	14	16	22
15	22	13	15	17	15
16	23	2	16	18	8
17	23	50	17	19	1
18	24	39	18	19	54
19	25	28	19	20	47
20	26	16	20	21	41
21	27	5	21	22	34
22	27	54	22	23	28
23	28	43	23	24	22
24	29	32	24	25	16
25	0 ♉	21	25	26	10
26	1	10	26	27	5
27	2	0	27	28	0
28	2	49	28	28	56
29	3	39	29	29	52
30	4	28	30	0 ♊	48

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The Table of the Nonagesime Degree, for the Latitude of 24 Degrees, continu'd.

Cusp 10. Gemini. °	Nonagesime. °	′	Cusp 10. Cancer. °	Nonagesime. °	′
0	0 ♊	48	0	0 ♋	0
1	1	44	1	1	0
2	2	40	2	2	0
3	3	36	3	3	0
4	4	33	4	4	0
5	5	30	5	4	59
6	6	27	6	5	59
7	7	24	7	6	59
8	8	21	8	7	58
9	9	19	9	8	57
10	10	17	10	9	57
11	11	15	11	10	56
12	12	13	12	11	55
13	13	11	13	12	54
14	14	9	14	13	53
15	15	8	15	14	52
16	16	7	16	15	50
17	17	6	17	16	49
18	18	5	18	17	47
19	19	4	19	18	45
20	20	3	20	19	43
21	21	3	21	20	41
22	22	2	22	21	39
23	23	1	23	22	37
24	24	1	24	23	34
25	25	1	25	24	31
26	26	0	26	25	28
27	27	0	27	26	24
28	28	0	28	27	20
29	49	0	29	28	16
30	0 ♋	0	30	29	12

The Table *of the Nonagesime Degree for the Latitude of* 24 *Degrees, continued.*

Cusp 10. *Leo.* °	Nonagesime. °	′	Cusp 10. *Virgo.* °	Nonagesime. °	′
0	29♋	12	0	25♌	32
1	0♌	8	1	26	22
2	1	4	2	27	11
3	1	59	3	28	1
4	2	54	4	28	50
5	3	49	5	29	39
6	4	44	6	0♍	28
7	5	38	7	1	17
8	6	32	8	2	6
9	7	26	9	2	55
10	8	19	10	3	44
11	9	13	11	4	33
12	10	6	12	5	21
13	10	59	13	6	10
14	11	52	14	6	59
15	12	45	15	7	48
16	13	38	16	8	36
17	14	30	17	9	24
18	15	22	18	10	11
19	16	14	19	11	0
20	17	6	20	11	48
21	17	57	21	12	36
22	18	48	22	13	24
23	19	39	23	14	13
24	20	30	24	15	2
25	21	21	25	15	50
26	22	11	26	16	39
27	23	2	27	17	28
28	23	52	28	18	17
29	24	42	29	19	6
30	25	32	30	19	55

The Table *of the Nonagesime Degree, for the Latitude of 24 Degrees, continued.*

Cusp 10 *Libra.* °	Nonagesime. ° ′	Cusp 10 *Scorpio* °	Nonagesime. ° ′
0	19 ♍ 55	0	15 ♎ 51
1	20 44	1	16 48
2	21 33	2	17 45
3	22 22	3	18 43
4	23 15	4	19 41
5	24 1	5	20 40
6	24 50	6	21 39
7	25 40	7	22 39
8	26 30	8	23 39
9	27 20	9	24 40
10	28 10	10	25 42
11	29 0	11	26 44
12	29 51	12	27 46
13	0 ♎ 42	13	28 49
14	1 33	14	29 52
15	2 24	15	0 ♏ 56
16	3 15	16	2 0
17	4 7	17	3 5
18	4 59	18	4 11
19	5 52	19	5 18
20	6 45	20	6 25
21	7 38	21	7 33
22	8 31	22	8 42
23	9 25	23	9 52
24	10 19	24	11 3
25	11 13	25	12 14
26	12 8	26	13 26
27	13 3	27	14 38
28	13 59	28	15 51
29	14 55	29	17 4
30	15 51	30	18 18

The Table *of the Nonagesime Degree for the Latitude of* 24 *Degrees, continued.*

Cusp 10. *Sagittary* °	Nonagesime. °	′	Cusp 10. *Capricorn* °	Nonagesime. °	′
0	18 ♏	18	0	0 ♑	0
1	19	33	1	1	29
2	20	49	2	2	58
3	22	5	3	4	27
4	23	22	4	5	55
5	24	40	5	7	23
6	25	58	6	8	50
7	27	17	7	10	18
8	28	37	8	11	45
9	29	57	9	13	12
10	1 ♐	18	10	14	33
11	2	40	11	16	6
12	4	3	12	17	32
13	5	26	13	18	58
14	6	50	14	20	23
15	8	14	15	21	47
16	9	38	16	23	11
17	11	3	17	24	34
18	12	29	18	25	57
19	13	55	19	27	19
20	15	22	20	28	41
21	16	49	21	0 ♒	2
22	18	16	22	1	23
23	19	43	23	2	43
24	21	10	24	4	2
25	22	38	25	5	20
26	24	6	26	6	38
27	25	35	27	7	55
28	27	3	28	9	12
29	28	32	29	10	28
30	0 ♑	0	30	11	43

The Table *of the Nonagesime Degree for the Latitude of 24 Degrees, continued.*

Cusp 10. Aquarius. °	Nonagesime. °	′	Cusp 10. Pisces. °	Nonagesime. °	′
0	11 ♒	43	0	14 ♓	9
1	12	57	1	15	5
2	14	10	2	16	1
3	15	23	3	16	57
4	16	35	4	17	52
5	17	46	5	18	47
6	18	56	6	19	41
7	20	6	7	20	35
8	21	15	8	21	29
9	22	24	9	22	23
10	23	32	10	23	16
11	24	40	11	24	9
12	25	47	12	25	1
13	26	54	13	25	53
14	28	0	14	26	45
15	29	5	15	27	36
16	0 ♓	9	16	28	27
17	1	12	17	29	18
18	2	15	18	0 ♈	9
19	3	17	19	1	0
20	4	19	20	1	50
21	5	20	21	2	40
22	6	20	22	3	30
23	7	20	23	4	20
24	8	19	24	5	9
25	9	19	25	5	59
26	10	28	26	6	49
27	11	17	27	7	38
28	12	15	28	8	27
29	13	12	29	9	16
30	14	9	30	10	5

A Table *of the Nonagesime Degree, for the Latitude of* 30 *Degrees.*

Cusp 10. *Aries.* °	Nonagesime. °	'	Cusp 10. *Taurus.* °	Nonagesime. °	'
0	12 ♈	59	0	6 ♉	44
1	13	47	1	7	32
2	14	35	2	8	20
3	15	23	3	9	9
4	16	10	4	9	58
5	16	58	5	10	47
6	17	45	6	11	36
7	18	32	7	12	26
8	19	19	8	13	15
9	20	6	9	14	5
10	20	54	10	14	55
11	21	41	11	15	45
12	22	28	12	16	35
13	23	16	13	17	25
14	24	3	14	18	15
15	24	50	15	19	6
16	25	37	16	19	56
17	26	25	17	20	47
18	27	12	18	21	38
19	27	59	19	22	29
20	28	46	20	23	21
21	29	34	21	24	12
22	0 ♉	21	22	25	4
23	1	8	23	25	56
24	1	56	24	26	48
25	2	44	25	27	41
26	3	32	26	28	34
27	4	20	27	29	26
28	5	8	28	0 ♊	19
29	5	56	29	1	12
30	6	44	30	2	6

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The Table *of the Nonagesime Degree, for the Latitude of 30 Degrees, continu'd.*

Cusp 10. *Gemini.* °	Nonagesime. °	′	Cusp 10. *Cancer.* °	Nonagesime. °	′
0	2 ♊	6	0	0 ♋	0
1	2	59	1	0	57
2	3	53	2	1	55
3	4	47	3	2	52
4	5	41	4	3	49
5	6	35	5	4	46
6	7	30	6	5	43
7	8	25	7	6	40
8	9	20	8	7	36
9	10	15	9	8	33
10	11	10	10	9	29
11	12	6	11	10	26
12	13	1	12	11	22
13	13	57	13	12	18
14	14	53	14	13	15
15	15	49	15	14	11
16	16	46	16	15	7
17	17	42	17	16	3
18	18	38	18	16	59
19	19	35	19	17	54
20	20	31	20	18	50
21	21	27	21	19	45
22	22	24	22	20	40
23	23	20	23	21	35
24	24	17	24	22	30
25	25	14	25	23	24
26	26	11	26	24	18
27	27	8	27	25	12
28	28	5	28	26	6
29	29	3	29	27	0
30	0 ♋	0	30	27	54

The Table *of the Nonagesime Degree, for the Latitude of* 30 *Degrees, continued.*

Cusp 10. *Leo* °	Nonagesime. °	′	Cusp 10. *Virgo* °	Nonagesime. °	′
0	27♋	54	0	23♌	15
1	28	47	1	24	4
2	29	41	2	24	52
3	0♌	34	3	25	40
4	1	27	4	26	28
5	2	20	5	27	16
6	3	12	6	28	4
7	4	5	7	28	52
8	4	57	8	29	39
9	5	49	9	0♍	27
10	6	40	10	1	15
11	7	32	11	2	2
12	8	23	12	2	50
13	9	14	13	3	37
14	10	5	14	4	24
15	10	56	15	5	11
16	11	47	16	5	58
17	12	37	17	6	45
18	13	27	18	7	32
19	14	17	19	8	19
20	15	6	20	9	6
21	15	56	21	9	53
22	16	45	22	10	40
23	17	35	23	11	28
24	18	24	24	12	15
25	19	13	25	13	2
26	20	2	26	13	50
27	20	51	27	14	38
28	21	39	28	15	25
29	22	37	29	16	13
30	23	15	30	17	1

The Table *of the Nonagesime Degree, for the Latitude of* 30 *Degrees, continued.*

Cusp 10. *Libra.* °	Nonagesime. °	'	Cusp 10. *Scorpio.* °	Nonagesime. °	'
0	17 ♍	1	0	12 ♎	40
1	17	49	1	13	37
2	18	37	2	14	34
3	19	25	3	15	32
4	20	13	4	16	30
5	21	2	5	17	29
6	21	50	6	18	28
7	22	39	7	19	28
8	23	28	8	20	28
9	24	17	9	21	29
10	25	7	10	22	31
11	25	56	11	23	33
12	26	46	12	24	36
13	27	36	13	25	40
14	28	27	14	26	44
15	29	18	15	27	49
16	0 ♎	9	16	28	55
17	1	0	17	0 ♏	2
18	1	52	18	1	9
19	2	44	19	2	17
20	3	36	20	3	26
21	4	29	21	4	36
22	5	22	22	5	47
23	6	15	23	6	58
24	7	9	24	8	10
25	8	3	25	9	23
26	8	58	26	10	37
27	9	53	27	11	51
28	10	48	28	13	6
29	11	44	29	14	23
30	12	40	30	15	40

The Table *of the Nonagesime Degree, for the Latitude of* 30 *Degrees, continued.*

Cusp 10. *Sagittary* ° ′	Nona-gesime. ° ′	Cusp 10. *Capricorn* °	Nona-gesime. ° ′
0	15 ♏ 50	0	0 ♑ 0
1	16 58	1	1 36
2	18 17	2	3 12
3	19 37	3	4 47
4	20 58	4	6 22
5	22 10	5	7 56
6	23 42	6	9 30
7	25 5	7	11 4
8	26 28	8	12 37
9	27 53	9	14 11
10	29 19	10	15 44
11	0 ♐ 45	11	17 16
12	2 12	12	18 48
13	3 40	13	20 19
14	5 9	14	21 50
15	7 39	15	23 20
16	8 10	16	24 50
17	9 41	17	26 19
18	11 12	18	27 47
19	12 44	19	29 15
20	14 16	20	0 ♒ 42
21	15 49	21	2 8
22	17 22	22	3 33
23	18 56	23	4 57
24	20 30	24	6 20
25	22 5	25	7 42
26	23 40	26	9 3
27	25 15	27	10 23
28	26 50	28	11 42
29	28 5	29	13 1
30	0 ♑ 0	30	14 20

The Table *of the Nonagesime Degree, for the Latitude of 30 Degrees, continu'd.*

Cusp 10. *Aquarius* °	Nonagesime. °	'	Cusp 10. *Pisces.* °	Nonagesime. °	'
0	14 ♒	20	0	17 ♓	20
1	15	38	1	18	16
2	16	54	2	19	12
3	18	9	3	20	7
4	19	23	4	21	4
5	20	37	5	21	37
6	21	50	6	22	51
7	23	2	7	23	45
8	24	14	8	24	38
9	25	25	9	25	31
10	26	35	10	26	24
11	27	44	11	27	16
12	28	51	12	28	8
13	29	58	13	29	0
14	1 ♓	4	14	29	51
15	2	10	15	0 ♈	42
16	3	15	16	1	32
17	4	19	17	2	22
18	5	23	18	3	12
19	6	26	19	4	2
20	7	29	20	4	52
21	8	31	21	5	41
22	9	32	22	6	31
23	10	33	23	7	20
24	11	33	24	8	10
25	12	32	25	8	58
26	13	31	26	9	47
27	14	29	27	10	35
28	15	27	28	11	23
29	16	24	29	12	11
30	17	20	30	12	59

The Table *of the Nonagesime Degree, for the Latitude of* 34 *Degrees.*

Cusp 10. Aries. °	Nonagesime. °	′	Cusp 10. Taurus. °	Nonagesime. °	′
0	15 ♈	4	0	8 ♉	18
1	15	51	1	9	5
2	16	38	2	9	53
3	17	24	3	10	40
4	18	10	4	11	28
5	18	57	5	12	15
6	19	44	6	13	3
7	20	30	7	13	51
8	21	46	8	14	39
9	22	2	9	15	27
10	22	49	10	16	15
11	23	35	11	17	3
12	24	22	12	17	52
13	25	8	13	18	41
14	25	54	14	19	30
15	26	40	15	20	19
16	27	26	16	21	9
17	28	12	17	21	58
18	28	59	18	22	48
19	29	45	19	23	38
20	0 ♉	32	20	24	28
21	1	18	21	25	18
22	2	4	22	26	9
23	2	51	23	26	59
24	3	37	24	27	50
25	4	24	25	28	41
26	5	11	26	29	32
27	5	58	27	0 ♊	23
28	6	45	28	1	14
29	7	31	29	2	6
30	8	18	30	2	58

The Table* *of the Nonagesime Degree, for the Latitude of 34 Degrees, continued.*

Cusp 10. *Gemini.* °	Nonagesime. °	′	Cusp 10. *Cancer.* ° ′	Nonagesime. °	′
0	2 ♊	58	0	0 ♋	0
1	3	50	1	0	55
2	4	42	2	1	50
3	5	35	3	2	46
4	6	27	4	3	41
5	7	20	5	4	36
6	8	13	6	5	31
7	9	6	7	6	26
8	10	0	8	7	21
9	10	53	9	8	16
10	11	47	10	9	11
11	12	40	11	10	6
12	13	34	12	11	0
13	14	28	13	11	55
14	15	22	14	12	49
15	16	16	15	13	43
16	17	11	16	14	37
17	18	5	17	15	31
18	19	0	18	16	25
19	19	55	19	17	19
20	20	50	20	18	13
21	21	44	21	19	7
22	22	39	22	20	1
23	23	34	23	20	54
24	24	29	24	21	47
25	25	24	25	22	40
26	26	19	26	23	32
27	27	14	27	24	25
28	28	9	28	25	17
29	29	5	29	26	9
30	0 ♋	0	30	27	1

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The Table *of the Nonagesime Degree, for the Latitude of* 34 *Degrees, continu'd.*

Cusp 10. *Leo.* °	Nona-gesime. °	′	Cusp 10. *Virgo.* °	Nona-gesime. °	′
0	27 ♋	1	0	21 ♌	42
1	27	53	1	22	29
2	28	45	2	23	16
3	29	37	3	24	2
4	0 ♌	28	4	24	49
5	1	19	5	25	36
6	2	10	6	26	23
7	3	1	7	27	10
8	3	52	8	27	56
9	4	42	9	28	43
10	5	32	10	29	29
11	6	22	11	0 ♍	15
12	7	12	12	1	2
13	8	2	13	1	48
14	8	51	14	2	34
15	9	41	15	3	20
16	10	30	16	4	6
17	11	19	17	4	52
18	12	8	18	5	38
19	12	57	19	6	24
20	13	45	20	7	11
21	14	34	21	7	57
22	15	22	22	8	43
23	16	10	23	9	30
24	16	57	24	10	16
25	17	45	25	11	3
26	18	32	26	11	50
27	19	20	27	12	36
28	20	7	28	13	23
29	20	55	29	14	9
30	21	42	30	14	56

The Table *of the Nonagesime Degree, for the Latitude of* 34 *Degrees, continu'd.*

Cusp 10. *Libra.* °	Nonagesime. °	′	Cusp 10. *Scorpio.* °	Nonagesime. °	′
0	14 ♍	56	0	10 ♎	14
1	15	43	1	11	11
2	16	30	2	12	8
3	17	17	3	13	5
4	18	4	4	14	3
5	18	52	5	15	1
6	19	40	6	16	0
7	20	28	7	17	0
8	21	16	8	18	1
9	22	5	9	19	3
10	22	54	10	20	4
11	23	43	11	21	8
12	24	32	12	22	11
13	25	21	13	23	15
14	26	11	14	24	20
15	27	1	15	25	26
16	27	51	16	26	32
17	28	42	17	27	39
18	29	33	18	28	47
19	0 ♎	24	19	29	56
20	1	16	20	1 ♏	5
21	2	8	21	2	16
22	3	0	22	3	28
23	3	53	23	4	40
24	4	46	24	5	54
25	5	39	25	7	9
26	6	33	26	8	24
27	7	27	27	9	40
28	8	22	28	10	56
29	9	18	29	12	13
30	10	14	30	13	21

The Table *of the Nonagesime Degree, for the Latitude of 34 Degrees, continu'd.*

Cusp 10. *Sagittary* °	Nonagesime. ° ′	Cusp 10. *Capricorn* °	Nonagesime. ° ′
0	13 ♏ 31	0	0 ♑ 0
1	14 51	1	1 42
2	16 13	2	3 23
3	17 36	3	5 4
4	19 0	4	6 45
5	20 24	5	8 25
6	21 49	6	10 5
7	23 15	7	11 44
8	24 42	8	13 23
9	26 10	9	15 2
10	27 39	10	16 40
11	29 9	11	18 17
12	0 ♐ 40	12	19 54
13	2 12	13	21 30
14	3 45	14	23 6
15	5 19	15	24 41
16	6 54	16	26 15
17	8 30	17	27 48
18	10 6	18	29 20
19	11 43	19	0 ♒ 50
20	13 21	20	2 20
21	15 0	21	3 49
22	16 39	22	5 17
23	18 18	23	6 44
24	19 57	24	8 10
25	21 37	25	9 35
26	23 17	26	11 0
27	24 57	27	12 24
28	26 38	28	13 47
29	28 19	29	15 9
30	0 ♑ 0	30	16 29

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The Table *of the Nonagesime Degree, for the Latitude of* 34 *Degrees, continued.*

Cusp 10. *Aquarius* °	Nona-gesime. °	′	Cusp 10. *Pisces* °	Nona-gesime. °	′
0	16♒	29	0	19♓	46
1	17	48	1	20	42
2	19	6	2	21	37
3	20	22	3	22	32
4	21	37	4	23	27
5	22	52	5	24	21
6	24	6	6	25	15
7	25	20	7	26	8
8	26	32	8	27	0
9	27	44	9	27	52
10	28	55	10	28	44
11	0♓	5	11	29	36
12	1	14	12	0♈	27
13	2	22	13	1	18
14	3	29	14	2	8
15	4	35	15	2	59
16	5	41	16	3	49
17	6	46	17	4	39
18	7	50	18	5	28
19	8	53	19	6	18
20	9	55	20	7	7
21	10	57	21	7	55
22	11	58	22	8	43
23	12	59	23	9	31
24	13	59	24	10	19
25	14	58	25	11	7
26	15	57	26	11	55
27	16	55	27	12	43
28	17	52	28	13	31
29	18	49	29	14	18
30	19	46	30	15	4

A Table *of the Nonag sime Degree for the Latitude of* 37 *Degrees.*

Cusp 10. *Aries.* °	Nonagesime. °	′	Cusp 10. *Taurus.* °	Nonagesime. °	′
0	16♈	45	0	9♉	33
1	17	31	1	10	19
2	18	17	2	11	6
3	19	3	3	11	52
4	19	49	4	12	38
5	20	34	5	13	25
6	21	20	6	14	11
7	22	6	7	14	58
8	22	51	8	15	41
9	23	37	9	16	31
10	24	23	10	17	29
11	25	8	11	18	7
12	25	53	12	18	35
13	26	59	13	19	43
14	27	24	14	20	31
15	28	9	15	21	18
16	28	55	16	22	6
17	29	40	17	22	55
18	0♉	25	18	23	44
19	1	10	19	24	32
20	1	55	20	25	21
21	2	41	21	26	10
22	3	26	22	27	0
23	4	12	23	27	49
24	4	58	24	28	39
25	5	43	25	29	28
26	6	29	26	0♊	18
27	7	15	27	1	9
28	8	1	28	1	59
29	8	47	29	2	49
30	9	33	30	3	40

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The Table *of the Nonagesime Degree, for the Latitude of 37 Degrees, continu'd.*

Cusp 10. Gemini. °	Nonagesime. °	′	Cusp 10. Cancer. °	Nonagesime. °	′
0	3 ♊	40	0	0 ♋	0
1	4	31	1	0	54
2	5	22	2	1	48
3	6	13	3	2	41
4	7	4	4	3	35
5	7	55	5	4	29
6	8	46	6	5	23
7	9	38	7	6	17
8	10	30	8	7	10
9	11	22	9	8	4
10	12	14	10	8	57
11	13	6	11	9	50
12	13	59	12	10	43
13	14	52	13	11	36
14	15	44	14	12	29
15	16	37	15	13	23
16	17	31	16	14	16
17	18	24	17	15	8
18	19	17	18	16	1
19	20	10	19	16	54
20	21	3	20	17	46
21	21	56	21	18	38
22	22	50	22	19	30
23	23	43	23	20	22
24	24	37	24	21	14
25	25	31	25	22	5
26	26	25	26	22	56
27	27	19	27	23	47
28	28	12	28	24	38
29	29	6	29	25	29
30	0 ♋	0	30	26	20

The Table *of the Nonagesime Degree, for the Latitude of* 37 *Degrees, continued.*

Cusp 10. *Leo* °	Nonagesime. °	′	Cusp 10. *Virgo.* °	Nonagesime. °	′
0	26 ♋	30	0	20 ♌	27
1	27	11	1	21	13
2	28	1	2	21	39
3	28	51	3	22	45
4	29	42	4	23	31
5	0 ♌	32	5	24	17
6	1	21	6	25	2
7	2	11	7	25	48
8	3	0	8	26	34
9	3	50	9	27	19
10	4	39	10	28	5
11	5	28	11	28	50
12	6	16	12	29	35
13	7	5	13	0 ♍	20
14	7	54	14	1	5
15	8	42	15	1	51
16	9	29	16	2	36
17	10	17	17	3	21
18	11	5	18	4	7
19	11	52	19	4	52
20	12	42	20	5	37
21	13	28	21	6	23
22	14	15	22	7	9
23	15	2	23	7	54
24	15	49	24	8	40
25	16	35	25	9	26
26	17	22	26	10	11
27	18	8	27	10	57
28	18	54	28	11	43
29	19	41	29	12	29
30	20	27	30	13	15

The Table *of the Nonagesime Degree, for the Latitude of 37 Degrees, continued.*

Cusp 10. *Libra.* °	Nona-gesime. ° ′		Cusp 10. *Scorpio.* °	Nona-gesime. ° ′	
0	13 ♍	15	0	8 ♎	15
1	14	2	1	9	11
2	14	48	2	10	8
3	15	34	3	11	5
4	16	21	4	12	3
5	17	8	5	13	1
6	17	55	6	14	0
7	18	43	7	15	0
8	19	31	8	16	0
9	20	19	9	17	1
10	21	7	10	18	3
11	21	55	11	19	5
12	22	44	12	20	8
13	23	33	13	21	12
14	24	22	14	22	17
15	25	11	15	23	23
16	26	1	16	24	30
17	26	50	17	25	28
18	27	40	18	26	46
19	28	30	19	27	55
20	29	21	20	29	5
21	0 ♎	12	21	0 ♏	16
22	1	4	22	1	28
23	1	56	23	2	41
24	2	49	24	3	55
25	3	42	25	5	10
26	4	36	26	6	26
27	5	30	27	7	44
28	6	25	28	9	3
29	7	20	29	10	23
30	8	15	30	11	43

A Table *of the Nonagesime Degree, for the Latitude of* 37 *Degrees, continued.*

Cusp 10. *Sagittary* °	Nona-gesime. °	′	Cusp 10. *Capricorn* °	Nona-gesime. °	′
0	11 ♏	43	0	0 ♑	0
1	13	4	1	1	46
2	14	26	2	3	32
3	15	50	3	5	18
4	17	15	4	7	4
5	18	42	5	8	50
6	20	10	6	10	35
7	21	39	7	12	20
8	23	9	8	14	2
9	24	40	9	15	47
10	26	12	10	17	29
11	27	46	11	19	11
12	29	21	12	20	52
13	0 ♐	56	13	22	32
14	2	32	14	24	11
15	4	10	15	25	50
16	5	49	16	27	28
17	7	28	17	29	4
18	9	8	18	0 ♒	39
19	10	49	19	2	14
20	12	31	20	3	48
21	14	13	21	5	20
22	15	56	22	6	51
23	17	40	23	8	21
24	19	25	24	9	50
25	21	10	25	11	18
26	22	56	26	12	45
27	24	42	27	14	10
28	26	38	28	15	34
29	28	14	29	16	56
30	0 ♑	0	30	18	17

The Table *of the Nonagesime Degree for the Latitude of* 37 *Degrees, continued.*

Cusp 10. *Aquarius* °	Nonagesime. °	'	Cusp 10. *Pisces.* °	Nonagesime. °	'
0	18 ♒	17	0	21 ♓	45
1	19	37	1	22	40
2	20	57	2	23	35
3	22	16	3	24	30
4	23	34	4	25	24
5	24	50	5	26	18
6	26	5	6	27	11
7	27	19	7	28	4
8	28	32	8	28	56
9	29	44	9	29	48
10	0 ♓	55	10	0 ♈	39
11	2	5	11	1	30
12	3	14	12	2	30
13	4	22	13	3	10
14	5	30	14	3	59
15	6	37	15	4	49
16	7	43	16	5	38
17	8	48	17	6	27
18	9	52	18	7	16
19	10	35	19	8	5
20	11	57	20	8	53
21	12	59	21	9	41
22	14	0	22	10	29
23	15	0	23	11	17
24	16	0	24	12	5
25	16	59	25	12	52
26	17	57	26	13	39
27	18	55	27	14	26
28	19	52	28	15	12
29	20	48	29	15	58
30	21	45	30	16	45

A Table *of the Nonagesime Degree, for the Latitude of* 40 *Degrees.*

Cusp 10. *Aries.* °	Nonagesime. °	ʹ	Cusp 10. *Taurus.* °	Nonagesime. °	ʹ
0	18 ♈	31	0	10 ♉	51
1	19	16	1	11	36
2	20	1	2	12	21
3	20	46	3	13	6
4	21	31	4	13	51
5	22	16	5	14	37
6	23	1	6	15	22
7	23	45	7	16	8
8	24	30	8	16	54
9	25	15	9	17	40
10	25	59	10	18	26
11	26	44	11	19	13
12	27	28	12	19	59
13	28	12	13	20	46
14	28	57	14	21	32
15	29	41	15	22	19
16	0 ♉	25	16	23	6
17	1	10	17	23	53
18	1	54	18	24	41
19	2	38	19	25	29
20	3	23	20	26	17
21	4	7	21	27	5
22	4	51	22	27	53
23	5	36	23	28	41
24	6	21	24	29	29
25	7	6	25	0 ♊	18
26	7	51	26	1	6
27	8	36	27	1	55
28	9	21	28	2	44
29	10	6	29	3	33
30	10	51	30	4	22

The Table *of the Nonagesime Degree, for the Latitude of* 40 *Degrees, continu'd.*

Cusp 10. Gemini. °	Nonagesime. °	'	Cusp 10. Cancer. °	Nonagesime. °	'
0	4 ♊	22	0	0 ♋	0
1	5	11	1	0	13
2	6	1	2	1	45
3	6	51	3	2	37
4	7	41	4	3	30
5	8	31	5	4	22
6	9	21	6	5	14
7	10	12	7	6	7
8	11	3	8	6	59
9	11	53	9	7	51
10	12	44	10	8	43
11	13	35	11	9	34
12	14	26	12	10	26
13	15	17	13	11	18
14	16	8	14	12	10
15	16	59	15	13	1
16	17	50	16	13	52
17	18	42	17	14	43
18	19	34	18	15	34
19	20	26	19	16	25
20	21	17	20	17	16
21	22	9	21	18	7
22	23	1	22	18	57
23	23	53	23	19	41
24	24	46	24	20	39
25	25	38	25	21	29
26	26	30	26	22	19
27	27	23	27	23	9
28	28	15	28	23	59
29	29	7	29	24	49
30	0 ♋	0	30	25	38

The Table *of the Nonagesime Degree for the Latitude of* 40 *Degrees, continued.*

Cusp 10. *Leo.* °	Nonagesime. °	′	Cusp 10. *Virgo.* °	Nonagesime. °	′
0	25 ♋	38	0	19 ♌	9
1	26	27	1	19	54
2	27	16	2	20	39
3	28	5	3	21	24
4	28	54	4	22	9
5	29	41	5	22	54
6	0 ♌	31	6	23	39
7	1	19	7	24	24
8	2	7	8	25	9
9	2	55	9	25	53
10	3	43	10	26	37
11	4	31	11	27	22
12	5	19	12	28	6
13	6	7	13	28	50
14	6	54	14	29	35
15	7	41	15	2 ♍	19
16	8	28	16	1	3
17	9	14	17	1	48
18	10	1	18	2	32
19	10	47	19	3	16
20	11	34	20	4	1
21	12	20	21	4	45
22	13	6	22	5	30
23	13	52	23	6	15
24	14	38	24	6	59
25	15	23	25	7	44
26	16	9	26	8	29
27	16	54	27	9	14
28	17	39	28	9	54
29	18	24	29	10	44
30	19	9	30	11	29

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The Table of the Nonagesime Degree, for the Latitude of 40 Degrees, continued.

Cusp 10. *Libra.* °	Nona-gesime. °	′	Cusp 10. *Scorpio* °	Nona-gesime. °	′
0	11 ♍	29	0	6 ♎	4
1	12	15	1	6	52
2	13	00	2	7	55
3	13	46	3	8	52
4	14	31	4	9	49
5	15	17	5	10	47
6	16	03	6	11	46
7	16	50	7	12	45
8	17	37	8	13	45
9	18	24	9	14	46
10	19	11	10	15	48
11	19	58	11	16	50
12	20	46	12	17	53
13	21	34	13	18	57
14	22	22	14	20	02
15	23	10	15	21	07
16	23	59	16	22	13
17	24	48	17	23	20
18	25	38	18	24	28
19	26	23	19	25	38
20	27	18	20	26	49
21	28	08	21	28	01
22	28	59	22	29	14
23	29	50	23	0 ♏	28
24	0 ♎	42	24	1	43
25	1	35	25	2	59
26	2	28	26	4	16
27	3	21	27	5	34
28	4	15	28	6	53
29	5	02	29	8	14
30	6	04	30	9	36

The Table *of the Nonagesime Degree, for the Latitude of* 40 *Degrees, continued.*

Cusp 10. *Sagittary* ° ′	Nona-gesime. ° ′	Cusp 10. *Capricorn* °	Nona-gesime. ° ′
0	9 ♏ 36	0	0 ♑ 0
1	10 59	1	1 52
2	12 24	2	3 44
3	15 50	3	5 36
4	15 17	4	7 27
5	16 46	5	9 19
6	18 16	6	11 10
7	19 48	7	13 1
8	21 21	8	14 51
9	22 55	9	16 40
10	24 30	10	18 28
11	26 7	11	20 15
12	27 45	12	22 1
13	29 24	13	23 46
14	1 ♐ 5	14	25 30
15	2 47	15	27 13
16	4 30	16	28 55
17	6 14	17	0 ♒ 36
18	7 59	18	2 15
19	9 45	19	3 53
20	11 32	20	5 30
21	13 20	21	7 5
22	15 9	22	8 39
23	16 59	23	10 12
24	18 50	24	11 44
25	20 41	25	13 14
26	22 33	26	14 43
27	24 24	27	16 10
28	26 16	28	17 36
29	28 8	29	19 1
30	0 ♑ 0	30	20 24

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The Table *of the Nonagesime Degree, for the Latitude of* 40 *Degrees, continu'd.*

Cusp 10. *Aquarius* °	Nonagesime. °	′	Cusp 10. *Pisces.* °	Nonagesime. °	′
0	20 ♒	24	0	23 ♓	56
1	21	46	1	24	51
2	23	7	2	25	45
3	24	26	3	26	39
4	25	24	4	27	32
5	27	1	5	28	25
6	28	17	6	29	18
7	29	32	7	0 ♈	10
8	0 ♓	46	8	1	01
9	1	59	9	1	52
10	3	11	10	2	42
11	4	22	11	3	32
12	5	32	12	4	22
13	6	40	13	5	12
14	7	47	14	6	01
15	8	53	15	6	50
16	9	58	16	7	38
17	11	3	17	8	26
18	12	7	18	9	14
19	13	10	19	10	02
20	14	12	20	10	49
21	15	14	21	11	36
22	16	15	22	12	26
23	17	15	23	13	10
24	18	14	24	13	57
25	19	13	25	14	43
26	20	11	26	15	29
27	21	08	27	16	14
28	22	05	28	17	0
29	23	01	29	17	45
30	23	56	30	18	31

The Table *of the Nonagesime Degree, for the Latitude of* 43 *Degrees.*

Cusp 10. *Aries.* °	Nonagesime. °	′	Cusp 10. *Taurus.* °	Nonagesime. °	′
0	20♈	24	0	12♉	12
1	21	8	1	12	56
2	21	52	2	13	40
3	22	36	3	14	24
4	23	20	4	15	08
5	24	4	5	15	52
6	24	48	6	16	37
7	25	31	7	17	21
8	26	15	8	18	06
9	26	59	9	18	51
10	27	42	10	19	36
11	28	26	11	20	21
12	29	9	12	21	06
13	29	52	13	21	52
14	0 ♉	35	14	22	37
15	1	19	15	23	23
16	2	2	16	24	09
17	2	45	17	24	55
18	3	29	18	25	41
19	4	12	19	26	27
20	4	55	20	27	14
21	5	39	21	28	0
22	6	23	22	28	47
23	7	6	23	29	34
24	7	49	24	0 ♊	21
25	8	33	25	1	08
26	9	17	26	1	55
27	10	01	27	2	43
28	10	45	28	3	50
29	11	28	29	4	18
30	12	12	30	5	06

The Table *of the Nonagesime Degree, for the Latitude of* 34 *Degrees, continued.*

Cusp 10. *Gemini.* °	Nonagesime. °	′	Cusp 10, *Cancer.* °	Nonagesime. °	′
0	5 ♊	6	0	0 ♋	0
1	5	54	1	0	51
2	6	42	2	1	41
3	7	31	3	2	32
4	8	19	4	3	23
5	9	08	5	4	14
6	9	57	6	5	05
7	10	46	7	5	56
8	11	35	8	6	46
9	12	24	9	7	36
10	13	13	10	8	26
11	14	03	11	9	16
12	14	53	12	10	06
13	15	43	13	10	57
14	16	33	14	11	47
15	17	23	15	12	37
16	18	13	16	13	27
17	19	03	17	14	17
18	19	54	18	15	07
19	20	44	19	15	57
20	21	34	20	16	47
21	22	24	21	17	35
22	23	14	22	18	25
23	24	04	23	19	14
24	24	55	24	20	03
25	25	46	25	20	52
26	26	37	26	21	41
27	27	28	27	22	29
28	28	19	28	23	18
29	29	09	29	24	06
30	0 ♋	0	30	24	54

The Table *of the Nonagesime Degree, for the Latitude of 43 Degrees, continu'd.*

Cusp 10. *Leo.* °	Nonagesime °	′	Cusp 10. *Virgo.* °	Nonagesime. °	′
0	24♋	54	0	17♌	48
1	25	42	1	18	32
2	26	30	2	19	15
3	27	17	3	19	59
4	28	05	4	20	45
5	28	52	5	21	27
6	29	39	6	22	11
7	0♌	26	7	22	54
8	1	13	8	23	37
9	2	0	9	24	21
10	2	46	10	25	05
11	3	33	11	25	48
12	4	19	12	26	31
13	5	05	13	27	15
14	5	51	14	27	58
15	6	37	15	28	41
16	7	23	16	29	25
17	8	h8	17	0♍	08
18	8	54	18	0	51
19	9	39	19	1	34
20	10	24	20	2	18
21	11	09	21	3	01
22	11	54	22	3	45
23	12	39	23	4	39
24	13	23	24	5	12
25	14	08	25	5	56
26	14	52	26	6	40
27	15	36	27	7	24
28	16	20	28	8	08
29	17	04	29	8	52
30	17	48	30	9	36

The Table *of the Nonagesime Degree, for the Latitude of 43 Degrees, continu'd.*

Cusp 10. *Libra.* °	Nona-gesim e. °	′	Cusp 10. *Scorpio.* °	Nona-gesime. °	′
0	9 ♍	36	0	3 ♎	19
1	10	21	1	4	34
2	11	06	2	5	29
3	11	51	3	6	25
4	12	35	4	7	22
5	13	20	5	8	19
6	14	05	6	9	17
7	14	50	7	10	15
8	15	36	8	11	14
9	16	22	9	12	14
10	17	08	10	13	15
11	17	54	11	14	17
12	18	41	12	15	20
13	19	21	13	16	24
14	20	14	14	17	29
15	21	01	15	18	34
16	21	49	16	19	40
17	22	37	17	20	47
18	23	25	18	21	55
19	24	14	19	23	05
20	25	03	20	24	16
21	23	53	21	25	28
22	26	43	22	26	41
23	27	33	23	27	55
24	28	24	24	29	9
25	29	15	25	0 ♏	25
26	0 ♎	7	26	1	42
27	0	59	27	3	1
28	1	52	28	4	22
29	2	45	29	5	44
30	3	39	30	7	8

The Table *of the Nonagesime Degree, for the Latitude of* 43 *Degrees, continu'd.*

Cusp 10. *Sagittary* °	Nonagesime. °	'	Cusp 10. *Capricorn* °	Nonagesime. °	'
0	7 ♏	8	0	0 ♑	0
1	8	34	1	2	0
2	10	1	2	4	0
3	11	29	3	6	0
4	12	58	4	8	0
5	14	29	5	10	0
6	16	1	6	11	59
7	17	35	7	13	57
8	19	11	8	15	54
9	20	48	9	17	49
10	22	26	10	19	42
11	24	6	11	21	34
12	25	48	12	23	25
13	27	32	13	25	16
14	29	28	14	27	6
15	1 ♐	5	15	28	55
16	2	54	16	0 ♒	42
17	4	44	17	2	28
18	6	35	18	4	12
19	8	26	19	5	54
20	10	18	20	7	34
21	12	11	21	9	12
22	14	6	22	10	49
23	16	3	23	12	25
24	18	1	24	13	59
25	20	0	25	15	31
26	22	0	26	17	2
27	24	0	27	18	32
28	26	0	28	19	59
29	28	0	29	21	26
30	0 ♑	0	30	22	52

The Table *of the Nonagesime Degree, for the Latitude of* 43 *Degrees, continued.*

Cusp 10. *Aquarius* °	Nonagesime. °	'	Cusp 10. *Pisces.* °	Nonagesime. °	'
0	22 ♒	52	0	26 ♓	21
1	24	16	1	27	15
2	25	38	2	28	8
3	26	59	3	29	1
4	28	18	4	29	53
5	29	35	5	0 ♈	45
6	0 ♓	51	6	1	36
7	2	5	7	2	27
8	3	19	8	3	17
9	4	32	9	4	7
10	5	44	10	4	57
11	6	55	11	5	46
12	8	5	12	6	35
13	9	13	13	7	23
14	10	20	14	8	11
15	11	26	15	8	59
16	12	31	16	9	46
17	13	36	17	10	32
18	14	40	18	11	19
19	15	43	19	12	6
20	16	45	20	12	52
21	17	46	21	13	38
22	18	46	22	14	24
23	19	45	23	15	20
24	20	43	24	15	55
25	21	41	25	16	40
26	22	38	26	17	25
27	23	35	27	18	9
28	24	31	28	18	54
29	25	26	29	19	39
30	26	21	30	20	24

A Table *of the Nonagesime Degree for the Latitude of* 45 *Degrees.*

Cusp 10. Aries. °	Nonagesime. °	′	Cusp 10. Taurus. ° ′	Nonagesime. °	′
0	21 ♈	45	0	13 ♉	9
1	22	28	1	13	52
2	23	12	2	14	35
3	23	55	3	15	18
4	24	29	4	16	2
5	25	22	5	16	45
6	26	5	6	17	29
7	26	47	7	18	13
8	27	30	8	18	17
9	28	12	9	19	41
10	28	55	10	20	25
11	29	37	11	21	9
12	0 ♉	19	12	21	53
13	1	2	13	22	37
14	1	44	14	23	22
15	2	27	15	24	6
16	3	9	16	24	51
17	3	52	17	25	37
18	4	34	18	26	22
19	5	17	19	27	7
20	5	59	20	27	52
21	6	42	21	28	38
22	7	25	22	29	24
23	8	7	23	0 ♊	10
24	8	50	24	0	56
25	9	33	25	1	42
26	10	17	26	2	29
27	11	0	27	3	16
28	11	43	28	4	2
29	12	26	29	4	49
30	13	9	30	5	36

The

The Table *of the Nonagesime Degree, for the Latitude of* 45 *Degrees, continu'd.*

Cusp 10. *Gemini.* °	Nonagesime. °	'	Cusp 10. *Cancer.* °	Nonagesime. °	'
0	5 ♊	36	0	0 ♋	0
1	6	23	1	0	50
2	7	10	2	1	40
3	7	58	3	2	29
4	8	46	4	3	19
5	9	33	5	4	9
6	10	21	6	4	58
7	11	9	7	5	48
8	11	57	8	6	37
9	12	45	9	7	27
10	13	53	10	8	16
11	14	22	11	9	5
12	15	11	12	9	55
13	16	0	13	10	44
14	16	49	14	11	33
15	17	38	15	12	22
16	18	27	16	13	11
17	19	16	17	14	0
18	20	5	18	14	49
19	20	55	19	15	38
20	21	44	20	16	27
21	22	33	21	17	15
22	23	23	22	18	3
23	24	12	23	18	51
24	25	2	24	19	39
25	25	51	25	20	27
26	26	41	26	21	14
27	27	31	27	22	2
28	28	20	28	22	50
29	29	10	29	23	37
30	0 ♋	0	30	24	24

The

The Table *of the Nonagesime Degree, for the Latitude of* 45 *Degrees, continued.*

Cusp 10. *Leo.* °	Nonagesime. °	′	Cusp 10. *Virgo.* °	Nonagesime. °	′
0	24♋	24	0	16♌	51
1	25	11	1	17	34
2	25	58	2	18	17
3	26	44	3	19	0
4	27	31	4	19	43
5	28	18	5	20	27
6	29	4	6	21	10
7	29	50	7	21	53
8	0♌	36	8	22	35
9	1	22	9	23	18
10	2	8	10	24	1
11	2	53	11	24	43
12	3	38	12	25	26
13	4	23	13	26	8
14	5	9	14	26	51
15	5	54	15	27	33
16	6	38	16	28	16
17	7	23	17	28	58
18	8	7	18	29	41
19	8	51	19	0♍	23
20	9	35	20	1	5
21	10	19	21	1	48
22	11	3	22	2	30
23	11	47	23	3	13
24	12	31	24	3	55
25	13	15	25	4	48
26	13	58	26	5	21
27	14	42	27	6	5
28	15	25	28	6	48
29	16	8	29	7	32
30	16	51	30	8	15

The Table *of the Nonagesime Degree, for the Latitude of* 45 *Degrees, continued.*

Cusp 10. *Libra.* °	Nonagesime. ° ′		Cusp 10. *Scorpio.* °	Nonagesime. ° ′	
0	8 ♍	15	0	1 ♎	56
1	8	58	1	2	50
2	9	42	2	3	44
3	10	26	3	4	39
4	11	10	4	5	35
5	11	55	5	6	31
6	12	39	6	7	28
7	13	23	7	8	26
8	14	8	8	9	24
9	14	53	9	10	23
10	15	38	10	11	24
11	16	24	11	12	26
12	17	10	12	13	28
13	17	56	13	14	31
14	18	42	14	15	35
15	19	28	15	16	40
16	20	15	16	17	46
17	21	2	17	18	53
18	21	49	18	20	0
19	22	37	19	21	8
20	23	26	20	22	18
21	24	15	21	23	30
22	25	5	22	24	43
23	25	55	23	25	58
24	26	45	24	27	14
25	27	36	25	28	31
26	28	37	26	29	50
27	29	29	27	1 ♏	10
28	0 ♎	11	28	2	31
29	1	3	29	3	53
30	1	56	30	5	17

The

A Table *of the Nonagesime Degree, for the Latitude of* 45 *Degrees, continued.*

Cusp 10. *Sagittary* °	Nonagesime. ° ′		Cusp 10. *Capricorn* °	Nonagesime. ° ′	
0	5 ♏	17	0	0 ♑	0
1	6	43	1	2	7
2	8	10	2	4	14
3	9	39	3	6	20
4	11	10	4	8	25
5	12	43	5	10	30
6	14	17	6	12	34
7	15	53	7	14	37
8	17	31	8	16	39
9	19	10	9	18	39
10	20	51	10	20	38
11	22	34	11	22	36
12	24	19	12	24	32
13	26	6	13	26	27
14	27	55	14	28	21
15	29	46	15	0 ♒	14
16	1 ♐	39	16	2	5
17	3	33	17	3	54
18	5	28	18	5	41
19	7	24	19	7	26
20	9	22	20	9	9
21	11	21	21	10	50
22	13	21	22	12	29
23	15	23	23	14	7
24	17	26	24	15	43
25	19	30	25	17	17
26	21	35	26	18	50
27	23	40	27	20	21
28	25	46	28	21	50
29	27	53	29	23	17
30	0 ♑	0	30	24	43

The Table *of the Nonagesime Degree, for the Latitude of 45 Degrees, continu'd.*

Cusp 10. *Aquarius* °	Nonagesime. °	'	Cusp 10. *Pisces.* °	Nonagesime. °	'
0	24 ♒	43	0	28 ♓	4
1	26	07	1	28	57
2	27	29	2	29	49
3	28	50	3	0 ♈	41
4	0 ♓	10	4	1	33
5	1	29	5	2	24
6	2	46	6	3	15
7	4	01	7	4	05
8	5	17	8	4	55
9	6	30	9	5	45
10	7	42	10	6	34
11	8	52	11	7	23
12	10	0	12	8	11
13	11	7	13	8	58
14	12	14	14	9	45
15	13	20	15	10	32
16	14	25	16	11	18
17	15	29	17	12	04
18	16	32	18	12	50
19	17	44	19	13	36
20	18	36	20	14	22
21	19	37	21	15	07
22	20	36	22	15	52
23	21	34	23	16	37
24	22	32	24	17	21
25	23	29	25	18	05
26	24	25	26	18	50
27	25	21	27	19	34
28	26	16	28	20	18
29	27	10	29	21	02
30	28	04	30	21	45

A Table *of the Nonagesime Degree, for the Latitude of* 46 *Degrees.*

Cusp 10. *Aries.* °	Nonagesime. °	′	Cusp 10. *Taurus.* °	Nonagesime. °	′
0	22 ♈	25	0	13 ♉	37
1	23	9	1	14	19
2	23	51	2	15	2
3	24	35	3	15	46
4	25	18	4	16	28
5	26	0	5	17	11
6	26	42	6	17	55
7	27	24	7	18	38
8	28	7	8	19	22
9	28	50	9	20	5
10	29	32	10	20	49
11	0 ♉	16	11	21	33
12	3	57	12	22	17
13	1	38	13	23	1
14	2	20	14	23	45
15	3	2	15	24	29
16	3	45	16	25	13
17	4	26	17	25	58
18	5	8	18	26	43
19	5	51	19	27	28
20	6	33	20	28	13
21	7	15	21	28	58
22	7	58	22	29	44
23	8	40	23	0 ♊	29
24	9	22	24	1	15
25	10	4	25	2	0
26	10	47	26	2	46
27	11	29	27	3	32
28	12	12	28	4	19
29	12	55	29	5	5
30	13	37	30	5	51

The Table *of the Nonagesime Degree, for the Latitude of 46 Degrees, continued.*

Cusp 10. *Gemini.* °	Nona-gesime. °	′	Cusp 10. *Cancer* °	Nona-gesime. °	′
0	5 ♊	51	0	0 ♋	0
1	6	38	1	0	50
2	7	25	2	1	39
3	8	12	3	2	28
4	8	59	4	3	17
5	9	46	5	4	6
6	10	33	6	4	55
7	11	21	7	5	45
8	12	9	8	6	34
9	12	56	9	7	22
10	13	44	10	8	11
11	14	32	11	9	0
12	15	21	12	9	49
13	16	9	13	10	37
14	16	57	14	11	25
15	17	46	15	12	14
16	18	34	16	13	3
17	19	22	17	13	51
18	20	11	18	14	39
19	21	0	19	15	28
20	21	49	20	16	16
21	22	37	21	17	4
22	23	26	22	17	51
23	24	15	23	18	39
24	25	5	24	19	26
25	25	54	25	20	13
26	26	42	26	21	1
27	27	32	27	21	48
28	28	21	28	22	35
29	29	10	29	23	22
30	0 ♋	0	30	24	9

The Table *of the Nonagesime Degree for the Latitude of* 46 *Degrees, continued.*

usp 10. eo. °	Nonagesime. °	′	Cusp 10. *Virgo* °	Nonagesime. °	′
0	24♋	9	0	16♌	23
1	24	55	1	17	5
2	25	41	2	17	48
3	26	27	3	18	30
4	27	13	4	19	13
5	28	0	5	19	55
6	28	45	6	20	38
7	29	30	7	21	20
8	0 ♌	16	8	22	2
9	1	1	9	22	45
10	1	46	10	23	27
11	2	32	11	24	9
12	3	17	12	24	51
13	4	1	13	25	34
14	4	46	14	26	15
15	5	31	15	26	58
16	6	15	16	27	40
17	6	59	17	28	28
18	7	43	18	29	4
19	8	27	19	29	46
20	9	11	20	0 ♍	28
21	9	55	21	1	10
22	10	38	22	1	53
23	11	21	23	2	35
24	12	5	24	3	18
25	12	49	25	4	0
26	13	32	26	4	42
27	14	14	27	5	25
28	14	58	28	6	8
29	15	51	29	6	50
30	16	23	30	7	35

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The Table of the Nonagesime Degree, for the Latitude of 46 Degrees, continued.

Cusp 10. *Libra.* °	Nonagesime. °	′	Cusp 10. *Scorpio* °	Nonagesime. °	′
0	7 ♌	35	0	1 ♎	3
1	8	17	1	1	56
2	9	1	2	2	50
3	9	44	3	3	45
4	10	28	4	4	40
5	11	12	5	5	36
6	11	56	6	6	32
7	12	40	7	7	31
8	13	24	8	8	30
9	14	9	9	9	28
10	14	53	10	10	29
11	15	38	11	11	30
12	16	25	12	12	31
13	17	10	13	13	34
14	17	56	14	14	37
15	18	42	15	15	41
16	19	29	16	16	48
17	21	15	17	17	55
18	21	2	18	19	2
19	22	50	19	20	10
20	23	38	20	21	21
21	23	26	21	22	32
22	24	15	22	23	44
23	25	4	23	24	59
24	25	54	24	26	14
25	26	35	25	27	30
26	27	36	26	28	48
27	28	27	27	0 ♏	8
28	29	18	28	1	29
29	0 ♎	10	29	2	51
30	1	3	30	4	15

The

The Table *of the Nonagesime Degree, for the Latitude of 46 Degrees, continued.*

Cusp 10. *Sagittary* °	Nonagesime. °	′	Cusp 10. *Capricorn* °	Nonagesime. °	′
0	4 ♏	15	0	0 ♑	0
1	5	43	1	2	12
2	7	13	2	4	21
3	8	43	3	6	29
4	10	13	4	8	39
5	11	45	5	10	46
6	13	19	6	12	52
7	14	57	7	15	0
8	16	38	8	17	5
9	18	17	9	19	9
10	20	0	10	21	11
11	21	45	11	23	11
12	23	32	12	25	11
13	25	19	13	27	9
14	27	9	14	29	3
15	29	2	15	0 ♒	58
16	0 ♐	56	16	2	51
17	2	51	17	4	41
18	4	49	18	6	28
19	6	49	19	8	15
20	8	49	20	10	0
21	10	50	21	11	42
22	12	54	22	13	22
23	15	0	23	15	03
24	17	8	24	16	40
25	19	14	25	18	14
26	21	23	26	19	47
27	23	31	27	21	17
28	25	39	28	22	47
29	27	48	29	24	17
30	0 ♑	0	30	25	45

The Table *of the Nonagesime Degree, for the Latitude of* 46 *Degrees, continu'd.*

Cusp 10. *Aquarius* °	Nona-gesime. °	′	Cusp 10. *Pisces.* °	Nona-gesime. °	′
0	25 ♒	45	0	28 ♓	57
1	27	09	1	29	50
2	28	31	2	0 ♈	42
3	29	52	3	1	33
4	1 ♓	11	4	2	24
5	2	30	5	3	15
6	3	46	6	4	06
7	5	01	7	4	56
8	6	15	8	5	44
9	7	28	9	6	33
10	8	39	10	7	21
11	9	49	11	8	09
12	10	58	12	8	57
13	12	04	13	9	45
14	13	12	14	10	31
15	14	18	15	11	17
16	15	22	16	12	04
17	16	26	17	12	43
18	17	28	18	13	35
19	18	30	19	14	21
20	19	31	20	15	06
21	20	31	21	15	51
22	21	30	22	16	36
23	22	29	23	17	20
24	23	27	24	18	04
25	24	24	25	18	48
26	25	20	26	19	32
27	26	15	27	20	16
28	27	10	28	20	59
29	28	04	29	21	42
30	28	57	30	22	25

The Table *of the Nonagesime Degree, for the Latitude of* 48 *Degrees.*

Cusp 10. *Aries.* °	Nonagesime. °	′	Cusp 10. *Taurus.* °	Nonagesime. °	′
0	23 ♈	53	0	14 ♉	38
1	24	37	1	15	20
2	25	19	2	16	02
3	26	00	3	16	44
4	26	42	4	17	26
5	27	24	5	18	09
6	28	05	6	18	51
7	28	46	7	19	33
8	29	27	8	20	16
9	0 ♉	09	9	20	58
10	0	50	10	21	40
11	1	32	11	22	23
12	2	13	12	23	05
13	2	54	13	23	48
14	3	35	14	24	31
15	4	16	15	25	14
16	4	57	16	25	58
17	5	38	17	26	42
18	6	19	18	27	26
19	7	01	19	28	10
20	7	42	20	28	54
21	8	23	21	29	39
22	9	05	22	0 ♊	23
23	9	46	23	1	07
24	10	28	24	1	52
25	11	09	25	2	37
26	11	51	26	3	22
27	12	32	27	4	07
28	13	14	28	4	53
29	13	56	29	5	38
30	14	38	30	6	23

The Table *of the Nonagesime Degree, for the Latitude of* 48 *Degrees, continued.*

Cusp 10. *Gemini.* °	Nonagesime. ° ′		Cusp 10, *Cancer.* °	Nonagesime. ° ′	
0	6 ♊	23	0	0 ♋	0
1	7	08	1	0	49
2	7	54	2	1	37
3	8	40	3	2	25
4	9	26	4	3	13
5	10	13	5	4	01
6	10	59	6	4	49
7	11	46	7	5	37
8	12	32	8	6	25
9	13	19	9	7	13
10	14	05	10	8	0
11	14	52	11	8	48
12	15	39	12	9	36
13	16	26	13	10	24
14	17	13	14	11	12
15	18	01	15	11	59
16	18	48	16	12	47
17	19	36	17	13	34
18	20	24	18	14	21
19	21	12	19	15	08
20	22	0	20	15	55
21	22	47	21	16	41
22	23	35	22	17	29
23	24	33	23	18	14
24	25	11	24	19	01
25	25	59	25	19	47
26	26	47	26	20	34
27	27	35	27	21	20
28	28	23	28	22	06
29	29	11	29	22	52
30	0 ♋	0	30	23	37

The Table *of the Nonagesime Degree for the Latitude of* 48 *Degrees, continued.*

Cusp 10. *Leo.* °	Nonagesime. ° ′		Cusp 10. *Virgo.* °	Nonagesime. ° ′	
0	23♋	37	0	15♌	22
1	24	22	1	16	04
2	25	07	2	16	46
3	25	53	3	17	28
4	26	38	4	18	09
5	27	23	5	18	51
6	28	08	6	19	32
7	28	53	7	20	14
8	29	37	8	20	55
9	0 ♌	21	9	21	37
10	1	06	10	22	18
11	1	50	11	22	59
12	2	34	12	23	41
13	3	18	13	24	22
14	4	02	14	25	03
15	4	46	15	25	44
16	5	29	16	26	25
17	6	12	17	27	06
18	6	55	18	27	47
19	7	37	19	28	28
20	8	20	20	29	10
21	9	02	21	29	51
22	9	44	22	2 ♍	33
23	10	27	23	1	14
24	11	09	24	1	55
25	11	51	25	2	36
26	12	34	26	3	18
27	13	16	27	4	0
28	13	58	28	4	41
29	14	40	29	5	23
30	15	22	30	6	05

The Table *of the Nonagesime Degree, for the Latitude of* 48 *Degrees, continu'd.*

Cusp 10. Libra. °	Nona-gesime °	′	Cusp 10. Scorpio. °	Nona-gesime. °	′
0	6 ♍	5	0	29 ♍	4
1	6	47	1	29	56
2	7	30	2	0 ♎	49
3	8	13	3	1	43
4	8	55	4	2	37
5	9	38	5	3	32
6	10	21	6	4	28
7	11	04	7	5	24
8	11	47	8	6	21
9	12	31	9	7	18
10	13	15	10	8	15
11	14	0	11	9	16
12	14	44	12	10	17
13	15	28	13	11	20
14	16	13	14	12	23
15	16	58	15	13	27
16	17	44	16	14	31
17	18	49	17	15	36
18	19	15	18	16	43
19	20	02	19	17	51
20	20	49	20	19	1
21	21	36	21	20	13
22	22	24	22	21	26
23	23	12	23	22	40
24	24	01	24	23	55
25	24	50	25	25	11
26	25	40	26	26	28
27	26	30	27	27	47
28	27	21	28	29	8
29	28	12	29	0 ♏	31
30	29	4	30	1	56

The Table *of the Nonagesime Degree, for the Latitude of* 48 *Degrees, continu'd.*

Cusp 10. *Sagittary* °	Nonagesime. ° ′	Cusp 10. *Capricorn* °	Nonagesime. ° ′
0	1 ♏ 56	0	0 ♑ 0
1	3 23	1	2 19
2	4 52	2	4 36
3	6 23	3	6 54
4	7 56	4	9 12
5	9 31	5	11 29
6	11 08	6	13 45
7	12 47	7	15 59
8	14 28	8	18 11
9	16 11	9	20 21
10	17 56	10	22 29
11	19 43	11	24 36
12	21 33	12	26 41
13	23 26	13	28 44
14	25 21	14	0 ♒ 44
15	27 18	15	2 42
16	29 16	16	4 39
17	1 ♐ 16	17	6 34
18	3 19	18	8 27
19	4 24	19	10 17
20	7 31	20	12 04
21	9 39	21	13 49
22	11 49	22	15 32
23	14 01	23	17 13
24	16 15	24	18 52
25	18 31	25	20 29
26	20 48	26	21 04
27	23 06	27	23 37
28	25 24	28	25 08
29	27 41	29	26 37
30	0 ♑ 0	30	28 04

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The Table *of the Nonagesime Degree, for the Latitude of 48 Degrees, continued.*

Cusp 10. *Aquarius* °	Nonagesime. °	'	Cusp 10. *Pisces.* °	Nonagesime. °	'
0	28 ♒	4	0	0 ♈	56
1	29	29	1	1	48
2	0 ♓	52	2	2	39
3	2	13	3	3	30
4	3	32	4	4	20
5	4	49	5	5	10
6	6	05	6	5	59
7	7	20	7	6	48
8	8	34	8	7	36
9	9	47	9	8	24
10	10	59	10	9	11
11	12	09	11	9	58
12	13	17	12	10	45
13	14	24	13	11	31
14	15	29	14	12	16
15	16	33	15	13	02
16	17	37	16	13	47
17	18	40	17	14	32
18	19	43	18	15	16
19	20	44	19	16	0
20	21	44	20	16	45
21	22	42	21	17	29
22	23	39	22	18	13
23	24	36	23	18	56
24	25	32	24	19	39
25	26	28	25	20	22
26	27	23	26	21	05
27	28	17	27	21	47
28	29	11	28	22	30
29	0 ♈	04	29	23	13
30	0	56	30	23	55

A Table *of the Nonagesime Degree for the Latitude of 51 Degrees.*

Cusp 10. *Aries.* °	Nonagesime. ° ′	Cusp 10. *Taurus.* °	Nonagesime. ° ′
0	26 ♈ 14	0	16 ♉ 12
1	26 55	1	16 53
2	27 35	2	17 33
3	28 15	3	18 14
4	28 56	4	18 54
5	29 36	5	19 35
6	0 ♉ 16	6	20 16
7	0 56	7	20 57
8	1 36	8	21 38
9	2 16	9	22 19
10	2 56	10	23 0
11	3 36	11	23 41
12	4 15	12	24 22
13	4 55	13	25 4
14	5 35	14	25 46
15	6 14	15	26 28
16	6 54	16	27 12
17	7 34	17	27 52
18	8 13	18	28 34
19	8 53	19	29 17
20	9 33	20	0 ♊ 0
21	10 13	21	0 42
22	10 53	22	1 25
23	11 33	23	2 08
24	12 12	24	2 51
25	12 52	25	3 34
26	13 32	26	4 18
27	14 12	27	5 02
28	14 52	28	5 45
29	15 32	29	6 29
30	16 12	30	7 13

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The Table *of the Nonagesime Degree, for the Latitude of 51 Degrees, continu'd.*

Cusp 10. *Gemini.* °	Nonagesime. °	′	Cusp 10. *Cancer.* °	Nonagesime. °	′
0	7 ♊	13	0	0 ♋	0
1	7	57	1	0	47
2	8	42	2	1	33
3	9	26	3	2	19
4	10	11	4	3	6
5	10	55	5	3	52
6	11	40	6	4	38
7	12	25	7	5	25
8	13	09	8	6	11
9	13	54	9	6	57
10	14	39	10	7	44
11	15	25	11	8	30
12	16	10	12	9	16
13	16	55	13	10	2
14	17	41	14	10	48
15	18	27	15	11	33
16	19	12	16	12	12
17	19	58	17	13	4
18	20	44	18	13	50
19	21	30	19	14	35
20	22	16	20	15	21
21	23	03	21	16	6
22	23	49	22	16	51
23	24	35	23	17	36
24	25	22	24	18	20
25	26	8	25	19	5
26	26	54	26	19	50
27	27	41	27	20	34
28	28	27	28	21	28
29	29	23	29	22	3
30	0 ♋	0	30	22	47

The Table *of the Nonagesime Degree, for the Latitude of 51 Degrees, continued.*

Cusp 10. *Leo.* °	Nonagesime. °	′	Cusp 10. *Virgo.* °	Nonagesime. °	′
0	22♋	47	0	13♌	48
1	23	31	1	14	28
2	24	15	2	15	8
3	24	58	3	15	48
4	25	42	4	16	28
5	26	26	5	17	8
6	27	9	6	17	48
7	27	52	7	18	27
8	28	35	8	19	7
9	29	18	9	19	47
10	0 ♌	0	10	20	26
11	0	43	11	21	6
12	1	26	12	21	47
13	2	8	13	22	26
14	2	50	14	23	6
15	3	32	15	23	46
16	4	14	16	24	25
17	4	56	17	25	5
18	5	38	18	25	45
19	6	19	19	26	25
20	7	0	20	27	4
21	7	41	21	27	44
22	8	22	22	28	24
23	9	3	23	29	4
24	9	44	24	29	44
25	10	25	25	0 ♍	24
26	11	6	26	1	4
27	11	46	27	1	45
28	12	27	28	2	25
29	13	7	29	3	5
30	13	48	30	3	46

The Table *of the Nonagesime Degree, for the Latitude of 51 Degrees, continued.*

Cusp 10. *Libra.* °	Nonagesime. °	′	Cusp 10. *Scorpio.* °	Nonagesime. °	′
0	3 ♍	46	0	25 ♍	51
1	4	26	1	26	41
2	5	7	2	27	32
3	5	48	3	28	24
4	6	30	4	29	16
5	7	11	5	0 ♎	9
6	7	52	6	1	3
7	8	34	7	1	58
8	9	16	8	2	53
9	9	18	9	3	49
10	10	41	10	4	46
11	11	23	11	5	43
12	12	6	12	6	42
13	12	49	13	7	42
14	13	32	14	8	43
15	14	15	15	9	45
16	14	58	16	10	48
17	15	42	17	11	52
18	16	26	18	12	58
19	17	11	19	14	4
20	17	57	20	15	12
21	18	41	21	16	21
22	19	28	22	17	32
23	20	15	23	18	44
24	21	1	24	19	58
25	21	48	25	21	14
26	22	36	26	22	31
27	23	24	27	23	50
28	24	12	28	25	11
29	25	1	29	26	33
30	25	51	30	27	57

A Table *of the Nonagesime Degree, for the Latitude of* 51 *Degrees, continued.*

Cusp 10. *Sagittary* °	Nonagesime. ° ′	Cusp 10. *Capricorn* °	Nonagesime. ° ′
0	27 ♎ 57	0	0 ♑ 0
1	29 23	1	2 36
2	0 ♏ 52	2	5 11
3	2 24	3	7 45
4	3 58	4	10 17
5	5 35	5	12 48
6	7 15	6	15 16
7	8 57	7	17 43
8	10 41	8	20 9
9	12 27	9	22 32
10	14 15	10	24 52
11	16 7	11	27 9
12	18 2	12	29 26
13	20 0	13	1 ♒ 40
14	22 0	14	3 50
15	24 3	15	5 57
16	26 10	16	8 0
17	28 20	17	10 0
18	0 ♐ 34	18	11 58
19	2 50	19	13 53
20	5 8	20	15 45
21	7 28	21	17 33
22	9 51	22	19 17
23	12 16	23	21 3
24	14 43	24	22 45
25	17 12	25	24 25
26	19 43	26	26 2
27	22 15	27	27 36
28	24 49	28	29 8
29	27 24	29	0 ♓ 37
30	0 ♑ 50	30	2 3

The Table *of the Nonagesime Degree, for the Latitude of* 51 *Degrees, continu'd.*

Cusp 10. *Aquarius* °	Nonagesime. °	'	Cusp 10. *Pisces.* °	Nonagesime. °	'
0	2 ♓	3	0	4 ♈	9
1	3	27	1	4	59
2	4	49	2	5	48
3	6	10	3	6	36
4	7	29	4	7	24
5	8	49	5	8	12
6	10	2	6	8	59
7	11	16	7	9	45
8	12	28	8	10	32
9	13	39	9	11	18
10	14	48	10	12	3
11	15	56	11	12	49
12	17	2	12	13	34
13	18	8	13	14	18
14	19	12	14	15	2
15	20	15	15	15	45
16	21	17	16	16	28
17	22	18	17	17	11
18	23	18	18	17	54
19	24	17	19	18	57
20	25	14	20	19	19
21	26	13	21	20	2
22	27	7	22	20	44
23	28	2	23	21	26
24	28	57	24	22	8
25	29	51	25	22	49
26	0 ♈	44	26	23	30
27	1	36	27	24	12
28	2	28	28	24	53
29	3	19	29	25	34
30	4	2	30	26	14

A Table *of the Nonagesime Degree, for the Latitude of* 52 *Degrees* 20 *Minutes.*

Cusp 10. *Aries.* °	Nonagesime. °	′	Cusp 10. *Taurus.* °	Nonagesime. °	′
0	27 ♈	18	0	17 ♉	12
1	27	40	1	17	41
2	28	10	2	18	22
3	28	42	3	19	2
4	29	2	4	19	43
5	29	43	5	20	23
6	0 ♉	23	6	21	3
7	1	7	7	21	42
8	2	41	8	22	23
9	3	17	9	22	41
10	3	56	10	23	21
11	4	37	11	23	41
12	5	18	12	24	22
13	5	53	13	25	42
14	6	32	14	26	23
15	7	11	15	27	4
16	7	50	16	27	44
17	8	30	17	28	26
18	9	10	18	29	7
19	9	51	19	29	49
20	10	27	20	0 ♊	31
21	11	10	21	1	13
22	11	48	22	1	55
23	12	21	23	2	37
24	13	17	24	3	20
25	13	46	25	4	3
26	14	27	26	4	45
27	15	4	27	5	28
28	15	45	28	6	11
29	16	25	29	6	54
30	17	12	30	7	36

The Table *of the Nonagesime Degree, for the Latitude of* 52 *Degrees* 20 *Minutes, continued.*

Cusp 10. *Gemini.* °	Nonagesime. °	′	Cusp 10. *Cancer.* °	Nonagesime. °	′
0	7 ♊	36	0	0 ♋	0
1	8	19	1	0	46
2	9	03	2	1	31
3	9	46	3	2	17
4	10	30	4	3	03
5	11	14	5	3	48
6	11	58	6	4	34
7	12	42	7	5	19
8	13	26	8	6	04
9	14	10	9	6	50
10	14	55	10	7	35
11	15	39	11	8	20
12	16	24	12	9	06
13	17	09	13	9	51
14	17	54	14	10	36
15	18	39	15	11	21
16	19	24	16	12	06
17	20	09	17	12	51
18	20	54	18	13	36
19	21	39	19	14	21
20	22	24	20	15	05
21	23	09	21	15	20
22	23	55	22	16	34
23	24	40	23	17	18
24	25	26	24	18	02
25	26	12	25	18	46
26	26	57	26	19	30
27	27	43	27	20	14
28	28	29	28	20	57
29	29	14	29	21	41
30	0 ♋	0	30	22	24

The Table *of the Nonagesime Degree for the Latitude of* 52 *Degrees* 20 *Minutes, continued.*

Cusp 10. Leo. °	Nonagesime. °	'	Cusp 10. Virgo. °	Nonagesime. °	'
0	22♋	24	0	13♌	3
1	23	07	1	13	43
2	23	50	2	14	22
3	24	33	3	15	01
4	25	16	4	15	41
5	25	58	5	16	20
6	26	41	6	16	59
7	27	23	7	17	39
8	28	06	8	18	18
9	28	48	9	18	57
10	29	30	10	19	36
11	0♌	12	11	20	15
12	0	54	12	20	54
13	1	36	13	21	33
14	2	17	14	22	12
15	2	58	15	22	51
16	3	39	16	23	30
17	4	20	17	24	09
18	5	01	18	24	48
19	5	42	19	25	27
20	6	22	20	26	06
21	7	03	21	26	45
22	7	44	22	27	24
23	8	24	23	28	04
24	9	04	24	28	43
25	9	44	25	29	23
26	10	24	26	0♍	02
27	11	04	27	0	42
28	11	44	28	1	21
29	12	24	29	2	01
30	13	03	30	2	42

The Table *of the Nonagesime Degree, for the Latitude of* 52 *Degrees,* 20 *Minutes, continued.*

Cusp 10. *Libra.* °	Nona-gesime. °	′	Cusp 10. *Scorpio.* °	Nona-gesime. °	′
0	2 ♍	42	0	24 ♍	23
1	3	22	1	25	12
2	4	2	2	26	2
3	4	42	3	26	54
4	5	22	4	27	41
5	6	2	5	28	36
6	6	43	6	29	30
7	7	23	7	0 ♎	24
8	8	5	8	1	20
9	8	46	9	2	14
10	9	27	10	3	9
11	10	10	11	4	7
12	10	53	12	5	6
13	11	34	13	6	5
14	12	16	14	7	4
15	13	0	15	8	4
16	13	43	16	9	6
17	14	26	17	10	8
18	15	8	18	11	12
19	15	54	19	12	18
20	16	36	20	13	25
21	17	21	21	14	31
22	18	7	22	15	41
23	18	54	23	16	52
24	19	39	24	18	5
25	20	26	25	19	18
26	21	13	26	20	56
27	22	0	27	21	53
28	22	47	28	23	14
29	23	38	29	24	37
30	24	23	30	26	1

The Table *of the Nonagesime Degree, for the Latitude of* 52 *Degrees* 20 *Minutes, continued.*

Cusp 10. Sagittary ° ′	Nonagesime. ° ′	Cusp 10. Capricorn °	Nonagesime. ° ′
0	26 ♎ 1	0	0 ♑ 0
1	27 27	1	2 44
2	28 56	2	5 27
3	0 ♏ 26	3	8 8
4	2 0	4	10 49
5	3 37	5	13 29
6	5 16	6	16 7
7	6 58	7	18 42
8	8 45	8	21 15
9	10 31	9	23 45
10	12 21	10	26 12
11	14 14	11	28 35
12	16 11	12	0 ♒ 56
13	18 12	13	2 15
14	20 16	14	5 28
15	22 24	15	7 38
16	24 35	16	9 45
17	26 48	17	11 49
18	29 6	18	13 50
19	1 ♐ 26	19	15 45
20	3 50	20	17 41
21	6 16	21	19 27
22	8 46	22	21 19
23	11 18	23	23 3
24	13 54	24	24 45
25	16 32	25	26 24
26	19 12	26	28 0
27	21 53	27	29 34
28	24 34	28	1 ♓ 5
29	27 17	29	2 34
30	0 ♑ 0	30	3 59

The Table *of the Nonagesime Degree, for the Latitude of* 52 *Degrees* 20 *Minutes, continu'd.*

Cusp 10. *Aquarius* °	Nona-gesime. °	′	Cusp 10. *Pisces.* °	Nona-gesime. °	′
0	3 ♓	59	0	5 ♈	37
1	5	25	1	6	26
2	6	49	2	7	14
3	8	8	3	8	2
4	9	26	4	8	50
5	10	42	5	9	37
6	11	57	6	10	23
7	13	10	7	11	8
8	14	21	8	11	54
9	15	31	9	12	39
10	16	39	10	13	27
11	17	46	11	14	8
12	18	52	12	14	33
13	19	56	13	15	34
14	20	57	14	16	18
15	22	0	15	17	1
16	23	0	16	17	44
17	23	59	17	18	26
18	24	58	18	19	8
19	25	57	19	19	50
20	26	53	20	20	32
21	27	49	21	21	13
22	28	45	22	21	54
23	29	39	23	22	31
24	0 ♈	32	24	23	16
25	1	25	25	23	57
26	2	16	26	24	37
27	3	6	27	25	18
28	3	56	28	25	58
29	4	47	29	26	38
30	5	37	30	27	18

The Table *of the Nonagesime Degree, for the Latitude of* 53 *Degrees* 22 *Minutes.*

Cusp 10. Aries. °	Nonagesime. °	'	Cusp 10. Taurus. °	Nonagesime. °	'
0	28 ♈	11	0	17 ♉	51
1	28	51	1	18	30
2	29	30	2	19	9
3	0 ♉	9	3	19	48
4	0	48	4	20	25
5	1	28	5	21	4
6	2	8	6	21	43
7	2	48	7	22	22
8	3	28	8	23	1
9	4	8	9	23	40
10	4	48	10	24	20
11	5	26	11	25	0
12	6	6	12	25	40
13	6	46	13	26	29
14	7	25	14	27	0
15	8	5	15	27	38
16	8	45	16	28	18
17	9	25	17	29	0
18	10	4	18	29	40
19	10	43	19	0 ♊	20
20	11	21	20	1	0
21	11	59	21	1	40
22	12	41	22	2	21
23	13	18	23	3	2
24	13	56	24	3	43
25	14	35	25	4	23
26	15	14	26	5	5
27	15	53	27	5	46
28	16	33	28	6	29
29	17	12	29	7	12
30	17	31	30	7	54

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The Table *of the Nonagesime Degree, for the* Latitude *of* 53 *Degrees* 22 *Miuutes, continu'd.*

Cusp 10. *Gemini.* °	Nonagesime. °	′	Cusp 10. *Cancer.* °	Nonagesime. °	′
0	7 ♊	54	0	0 ♋	0
1	8	37	1	0	46
2	9	21	2	1	31
3	10	4	3	2	16
4	10	47	4	3	0
5	11	30	5	3	45
6	12	13	6	4	30
7	12	56	7	5	14
8	13	39	8	5	59
9	14	22	9	6	44
10	15	6	10	7	28
11	15	49	11	8	12
12	16	33	12	8	57
13	17	17	13	9	42
14	18	1	14	10	26
15	18	46	15	11	11
16	19	30	16	11	56
17	20	15	17	12	40
18	20	59	18	13	24
19	21	44	19	14	9
20	22	29	20	14	53
21	23	14	21	15	37
22	23	58	22	16	21
23	24	43	23	17	5
24	25	29	24	17	49
25	26	14	25	18	34
26	26	58	26	19	18
27	27	44	27	20	1
28	28	29	28	20	43
29	29	14	29	21	26
30	0 ♋	0	30	22	6

The Table *of the Nonagesime Degree for the Latitude of* 53 *Degrees* 22 *Minutes, continued.*

Cusp 10. *Leo.* °	Nonagesime. °	'	Cusp 10. *Virgo.* °	Nonagesime. °	'
0	22♋	6	0	12♌	09
1	22	48	1	12	48
2	23	31	2	13	27
3	24	13	3	14	06
4	24	55	4	14	44
5	25	37	5	15	22
6	26	19	6	16	01
7	26	58	7	16	41
8	27	40	8	17	20
9	28	22	9	18	09
10	29	03	10	18	48
11	29	45	11	19	27
12	0♌	26	12	20	06
13	1	07	13	20	45
14	1	48	14	21	24
15	2	29	15	22	03
16	3	09	16	22	43
17	3	49	17	23	22
18	4	29	18	24	01
19	5	09	19	24	40
20	5	48	20	25	19
21	6	27	21	25	58
22	7	06	22	26	37
23	7	45	23	27	16
24	8	24	24	27	55
25	9	02	25	28	34
26	9	39	26	29	13
27	10	18	27	29	52
28	10	57	28	2♍	31
29	11	34	29	1	10
30	12	09	30	1	49

The Table *of the Nonagesime Degree, for the Latitude of* 53 *Degrees* 22 *Minutes, continu'd.*

Cusp 10. *Libra.* °	Nonagesime. °	′	Cusp 10. *Scorpio.* °	Nonagesime. °	′
0	1 ♍	49	0	23 ♍	6
1	2	29	1	23	54
2	3	08	2	24	44
3	3	48	3	25	34
4	5	28	4	26	24
5	5	08	5	27	15
6	5	48	6	28	06
7	6	28	7	28	58
8	7	08	8	29	51
9	7	49	9	0 ♎	44
10	8	30	10	1	37
11	9	10	11	2	33
12	9	51	12	3	29
13	10	31	13	4	26
14	11	12	14	5	26
15	11	54	15	6	26
16	12	36	16	7	27
17	13	16	17	8	30
18	13	57	18	9	33
19	14	42	19	10	37
20	15	25	20	11	44
21	16	09	21	12	52
22	16	55	22	14	02
23	17	39	23	15	12
24	18	24	24	16	24
25	19	10	25	17	37
26	19	57	26	18	54
27	20	44	27	20	12
28	21	30	28	21	33
29	22	18	29	22	54
30	23	06	30	24	17

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The Table *of the Nonagesime Degree, for the Latitude of 53 Degrees 22 Minutes, continu'd.*

Cusp 10. *Sagittary* °	Nonagesime. °	′	Cusp 10. *Capricorn* °	Nonagesime. °	′
0	24 ♎	17	0	0 ♑	0
1	25	34	1	2	52
2	27	15	2	5	40
3	28	46	3	8	27
4	0 ♏	21	4	11	16
5	2	0	5	14	0
6	3	39	6	16	43
7	5	22	7	19	26
8	7	10	8	22	02
9	8	58	9	24	37
10	10	51	10	27	08
11	12	47	11	29	35
12	14	47	12	2 ♒	01
13	16	51	13	4	22
14	18	06	14	6	39
15	21	07	15	8	53
16	23	21	16	11	04
17	25	36	17	13	09
18	27	57	18	15	12
19	0 ♐	22	19	17	12
20	2	50	20	19	08
21	5	21	21	21	03
22	7	55	22	22	51
23	10	31	23	24	38
24	13	14	24	26	23
25	15	58	25	28	03
26	18	44	26	29	40
27	21	30	27	1 ♓	14
28	24	17	28	2	46
29	27	06	29	4	16
30	0 ♑	0	30	5	43

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The Table *of the Nonagesime Degree, for the Latitude of* 53 *Degrees* 22 *Minutes, continued.*

Cusp 10. *Aquarius* °	Nonagesime. ° ′	Cusp 10. *Pisces.* °	Nonagesime. ° ′
0	5 ♓ 43	0	6 ♈ 54
1	7 05	1	7 42
2	8 25	2	8 28
3	9 45	3	9 17
4	11 01	4	10 01
5	12 17	5	10 46
6	13 29	6	11 31
7	14 40	7	12 15
8	15 49	8	12 59
9	16 59	9	13 43
10	18 07	10	14 26
11	19 14	11	15 10
12	20 18	12	15 53
13	21 21	13	16 36
14	22 24	14	17 19
15	23 25	15	18 01
16	24 25	16	18 44
17	25 25	17	19 25
18	26 23	18	20 07
19	27 20	19	20 48
20	28 16	20	21 29
21	29 11	21	22 10
22	0 ♈ 04	22	22 51
23	0 58	23	23 32
24	1 51	24	24 12
25	2 43	25	24 52
26	3 35	26	25 32
27	4 25	27	26 13
28	5 13	28	26 53
29	6 05	29	27 32
30	6 54	30	28 11

A

A Table *of the Nonagesime Degree for the Latitude of* 54 *Degrees.*

Cusp 10. Aries. °	Nonagesime. °	′	Cusp 10. Taurus. °	Nonagesime. °	′
0	28 ♈	47	0	17 ♉	54
1	29	27	1	18	33
2	0 ♉	4	2	19	12
3	0	42	3	19	51
4	1	21	4	20	30
5	1	59	5	21	09
6	2	38	6	21	48
7	3	16	7	22	27
8	3	54	8	23	07
9	4	32	9	23	46
10	5	10	10	24	25
11	5	48	11	25	05
12	6	26	12	25	46
13	7	04	13	26	26
14	7	42	14	27	06
15	8	21	15	27	46
16	8	59	16	28	26
17	9	37	17	29	08
18	10	15	18	29	49
19	10	53	19	0 ♊	29
20	11	31	20	1	10
21	12	09	21	1	51
22	12	47	22	2	32
23	13	25	23	3	13
24	14	03	24	3	54
25	14	41	25	4	36
26	15	20	26	5	18
27	15	58	27	6	0
28	16	37	28	6	42
29	17	15	29	7	24
30	17	54	30	8	06

The

The Table of the Nonagesime Degree, for the Latitude of 54 Degrees, continu'd.

Cusp 10. *Gemini.* °	Nonagesime. °	′	Cusp 10. *Cancer.* °	Nonagesime. °	′
0	8 ♊	6	0	0 ♋	0
1	8	49	1	0	45
2	9	31	2	1	29
3	10	14	3	2	14
4	10	56	4	2	58
5	11	39	5	3	43
6	12	22	6	4	27
7	13	05	7	5	12
8	13	49	8	5	57
9	14	32	9	6	41
10	15	16	10	7	25
11	15	59	11	8	10
12	16	43	12	8	54
13	17	26	13	9	38
14	18	10	14	10	22
15	18	54	15	11	06
16	19	38	16	11	50
17	20	22	17	12	34
18	21	06	18	13	17
19	21	50	19	14	01
20	22	35	20	14	44
21	23	19	21	15	18
22	24	03	22	16	11
23	24	48	23	16	41
24	25	33	24	17	38
25	26	17	25	18	21
26	27	02	26	19	04
27	27	46	27	19	46
28	28	31	28	20	29
29	29	15	29	21	11
30	0 ♋	0	30	21	54

The Table *of the Nonagesime Degree, for the Latitude of* 54 *Degrees, continued.*

Cusp 10. *Leo.* °	Nonagesime. °	′	Cusp 10. *Virgo.* °	Nonagesime. °	′
0	21♋	54	0	12♌	6
1	22	36	1	12	45
2	23	18	2	13	23
3	24	0	3	14	02
4	24	42	4	14	40
5	25	24	5	15	19
6	26	6	6	15	57
7	26	47	7	16	35
8	27	28	8	17	13
9	28	09	9	17	51
10	28	50	10	18	29
11	29	31	11	19	07
12	0♌	12	12	19	45
13	0	53	13	20	23
14	1	34	14	21	01
15	2	14	15	21	39
16	2	54	16	22	18
17	3	34	17	22	56
18	4	14	18	23	34
19	4	55	19	24	12
20	5	35	20	24	50
21	6	14	21	25	28
22	6	53	22	26	06
23	7	33	23	26	44
24	8	12	24	27	22
25	8	51	25	28	01
26	9	30	26	28	39
27	10	09	27	29	18
28	10	48	28	29	56
29	11	27	29	0♍	35
30	12	06	30	1	13

The Table *of the Nonageſime Degree, for the Latitude of* 54 *Degrees, continued.*

Cuſp 10. *Libra.* °	Nonageſime. °	'	Cuſp 10. *Scoapio.* °	Nonageſime. °	'
0	1 ♍	13	0	22 ♍	14
1	1	52	1	23	02
2	2	31	2	23	50
3	3	10	3	24	39
4	3	49	4	25	29
5	4	28	5	26	19
6	5	07	6	27	10
7	5	47	7	28	02
8	6	27	8	28	55
9	7	08	9	29	49
10	7	48	10	0 ♎	43
11	8	29	11	1	38
12	9	10	12	2	34
13	9	51	13	3	30
14	10	32	14	4	27
15	11	13	15	5	26
16	11	54	16	6	26
17	12	36	17	7	27
18	13	18	18	8	30
19	14	0	19	9	34
20	14	43	20	10	40
21	15	26	21	11	47
22	16	10	22	12	55
23	16	54	23	14	04
24	17	39	24	15	15
25	18	24	25	16	28
26	19	09	26	17	43
27	19	54	27	18	59
28	20	40	28	20	17
29	21	27	29	21	38
30	22	14	30	23	02

The Table *of the Nonagesime Degree, for the Latitude of* 54 *Degrees, continued.*

Cusp 10. *Sagittary* °	Nona-gesime. °	'	Cusp 10. *Capricorn* °	Nona-gesime. °	'
0	23 ♎	2	0	0 ♑	0
1	24	28	1	3	0
2	25	56	2	5	57
3	27	25	3	8	52
4	28	57	4	11	46
5	0 ♏	33	5	14	38
6	2	12	6	17	28
7	[illegible]	54	7	20	15
8	5	40	8	23	0
9	7	30	9	25	41
10	9	24	10	28	17
11	11	21	11	0 ♒	50
12	13	20	12	3	18
13	15	23	13	5	43
14	17	30	14	8	02
15	19	41	15	10	19
16	21	58	16	12	30
17	24	17	17	14	37
18	26	42	18	16	40
19	29	10	19	18	39
20	1 ♐	43	20	20	36
21	4	19	21	22	30
22	7	10	22	24	20
23	9	45	23	26	06
24	12	32	24	27	48
25	15	22	25	29	27
26	18	14	26	1 ♓	3
27	21	8	27	2	35
28	24	3	28	4	04
29	27	0	29	5	32
30	0 ♑	0	30	6	58

The

The Table *of the Nonagesime Degree, for the Latitude of* 54 *Degrees, continu'd.*

Cusp 10. *Aquarius* °	Nona-gesime. °	'	Cusp 10. *Pisces.* °	Nona-gesime. °	'
0	6 ♓	58	0	7 ♈	46
1	8	22	1	8	33
2	9	43	2	9	20
3	11	01	3	10	06
4	12	17	4	10	51
5	13	32	5	11	36
6	14	45	6	12	21
7	15	56	7	13	06
8	17	05	8	13	50
9	18	13	9	14	34
10	19	20	10	15	17
11	20	26	11	16	0
12	21	30	12	16	42
13	22	33	13	17	24
14	23	34	14	18	06
15	24	34	15	18	47
16	25	33	16	19	28
17	26	30	17	20	09
18	27	26	18	20	50
19	28	22	19	21	31
20	29	17	20	22	12
21	0 ♈	11	21	22	52
22	1	05	22	23	33
23	1	58	23	24	13
24	2	50	24	24	53
25	3	41	25	25	32
26	4	31	26	26	11
27	5	21	27	26	50
28	6	10	28	27	29
29	6	58	29	28	08
30	7	46	30	28	47

A Table *of the Nonagesime Degree, for the Latitude of* 57 *Degrees.*

Cusp 10. *Aries.* °	Nonagesime. °	′	Cusp 10. *Taurus.* °	Nonagesime. °	′
0	1 ♉	34	0	19 ♉	45
1	2	10	1	20	21
2	2	47	2	20	58
3	3	23	3	21	35
4	4	0	4	22	12
5	4	36	5	22	49
6	5	13	6	23	27
7	5	49	7	24	04
8	6	25	8	24	42
9	7	02	9	25	20
10	7	38	10	25	58
11	8	14	11	26	36
12	8	50	12	27	14
13	9	26	13	27	52
14	10	02	14	28	30
15	10	38	15	29	08
16	11	14	16	29	47
17	11	51	17	0 ♊	26
18	12	27	18	1	05
19	13	03	19	1	44
20	13	39	20	2	23
21	14	15	21	3	03
22	14	52	22	3	42
23	15	28	23	4	22
24	16	04	24	5	01
25	16	41	25	5	41
26	17	18	26	6	21
27	17	54	27	7	01
28	18	31	28	7	41
29	19	08	29	8	21
30	19	55	30	9	01

The

The Table *of the Nonagesime Degree, for the Latitude of* 57 *Degrees, continued.*

Cusp 10. *Gemini.* °	Nonagesime. °	′	Cusp 10. *Cancer.* °	Nonagesime. °	′
0	9 ♊	1	0	0 ♋	0
1	9	42	1	0	43
2	10	23	2	1	26
3	11	04	3	2	09
4	11	45	4	2	52
5	12	26	5	3	34
6	13	07	6	4	17
7	13	48	7	4	59
8	14	30	8	5	42
9	15	11	9	6	24
10	15	23	10	7	07
11	16	34	11	7	49
12	17	16	12	8	31
13	17	58	13	9	14
14	18	40	14	9	56
15	19	22	15	10	38
16	20	04	16	11	20
17	20	46	17	12	02
18	21	29	18	12	44
19	22	11	19	13	26
20	22	53	20	14	07
21	23	36	21	14	49
22	24	18	22	15	30
23	25	01	23	16	12
24	25	43	24	16	53
25	26	26	25	17	34
26	27	08	26	18	15
27	27	51	27	18	56
28	28	34	28	19	37
29	29	17	29	20	18
30	0 ♋	0	30	20	59

The

The Table of the Nonagesime Degree for the Latitude of 57 Degrees, continued.

Cusp 10. *Leo.* °	Nonagesime. °	′	Cusp 10. *Virgo.* °	Nonagesime. °	′
0	20 ♋	59	0	10 ♌	15
1	21	39	1	10	52
2	22	19	2	11	29
3	22	59	3	12	06
4	23	39	4	12	42
5	24	19	5	13	19
6	24	59	6	13	56
7	25	38	7	14	32
8	26	18	8	15	08
9	26	57	9	15	45
10	27	37	10	16	21
11	28	16	11	16	57
12	28	55	12	17	33
13	29	34	13	18	09
14	0 ♌	13	14	18	46
15	0	52	15	19	22
16	1	30	16	19	58
17	2	08	17	20	34
18	2	46	18	21	10
19	3	24	19	21	46
20	4	02	20	22	22
21	4	40	21	22	58
22	5	18	22	23	35
23	5	56	23	24	11
24	6	33	24	24	47
25	7	11	25	25	24
26	7	48	26	26	0
27	8	25	27	26	37
28	9	02	28	27	13
29	9	39	29	27	50
30	10	15	30	28	26

The Table *of the Nonagesime Degree, for the Latitude of* 57 *Degrees, continued.*

Cusp 10. *Libra.* °	Nona-gesime. °	'	Cusp 10. *Scorpio* °	Nona-gesime. °	'
0	28♌	26	0	18♍	08
1	29	03	1	18	52
2	29	40	2	19	37
3	0♍	16	3	20	23
4	0	53	4	21	09
5	1	30	5	21	56
6	2	07	6	22	44
7	2	44	7	23	32
8	3	22	8	24	21
9	3	59	9	25	11
10	4	37	10	26	01
11	5	15	11	26	52
12	5	53	12	27	44
13	6	31	13	28	37
14	7	10	14	29	31
15	7	49	15	0♎	26
16	8	28	16	1	21
17	9	07	17	2	18
18	9	47	18	3	16
19	10	27	19	4	15
20	11	07	20	5	15
21	11	48	21	6	17
22	12	29	22	7	20
23	13	10	23	8	24
24	13	51	24	9	30
25	14	33	25	10	38
26	15	15	26	11	49
27	15	58	27	13	02
28	16	41	28	14	16
29	17	24	29	15	32
30	18	08	30	16	50

A Table *of the Nonagesime Degree, for the Latitude of* 57 *Degrees, continued.*

Cusp 10. *Sagittary* °	Nonagesime. ° ′	Cusp 10. *Capricorn* °	Nonagesime. ° ′
0	16 ♎ 50	0	0 ♑ 0
1	18 11	1	3 40
2	19 35	2	7 16
3	21 02	3	10 47
4	22 32	4	14 16
5	24 05	5	17 41
6	25 42	6	21 01
7	27 22	7	24 17
8	29 05	8	27 26
9	0 ♏ 52	9	0 ♒ 31
10	2 45	10	3 30
11	4 43	11	6 21
12	6 46	12	9 04
13	8 53	13	11 39
14	11 07	14	14 10
15	13 25	15	16 35
16	15 50	16	18 53
17	18 21	17	21 07
18	20 56	18	23 14
19	23 39	19	25 17
20	26 30	20	27 15
21	29 29	21	29 08
22	2 ♐ 34	22	0 ♓ 55
23	5 43	23	2 38
24	8 59	24	4 18
25	12 19	25	5 45
26	15 44	26	7 28
27	19 13	27	8 58
28	22 44	28	10 25
29	26 20	29	11 49
30	0 ♑ 0	30	13 10

The Table *of the Nonagesime Degree, for the Latitude of 57 Degrees, continued.*

Cusp 10. *Aquarius* ° ′	Nona-gesime. ° ′		Cusp 10. *Capricorn* °	Nona-gesime. ° ′	
0	13 ♓	10	0	11 ♈	52
1	14	28	1	12	36
2	15	44	2	13	19
3	16	58	3	14	02
4	18	11	4	14	45
5	19	22	5	15	27
6	20	30	6	16	09
7	21	36	7	16	50
8	22	40	8	17	31
9	23	43	9	18	12
10	24	45	10	18	53
11	25	45	11	19	33
12	26	44	12	20	13
13	27	42	13	20	53
14	28	39	14	21	32
15	29	34	15	22	11
16	0 ♈	29	16	22	50
17	1	23	17	23	29
18	2	16	18	24	07
19	3	08	19	24	45
20	3	59	20	25	23
21	4	49	21	26	01
22	5	39	22	26	38
23	6	28	23	27	16
24	7	16	24	27	53
25	8	04	25	28	30
26	8	51	26	29	07
27	9	37	27	29	44
28	10	23	28	0 ♉	20
29	11	08	29	0	57
30	11	52	30	1	34

A Table *of the Nonagesime Degree, for the Latitude of* 60 *Degrees.*

Cusp 10. *Aries.* °	Nonagesime. °	'	Cusp 10. *Taurus.* °	Nonagesime. °	'
0	4 ♉	39	0	21 ♉	43
1	5	13	1	22	18
2	5	47	2	22	53
3	6	21	3	23	28
4	6	55	4	24	04
5	7	29	5	24	39
6	8	03	6	25	15
7	8	37	7	25	50
8	9	11	8	26	26
9	9	44	9	27	02
10	10	18	10	27	38
11	10	52	11	28	14
12	11	26	12	28	50
13	12	0	13	29	26
14	12	34	14	0 ♊	03
15	13	08	15	0	39
16	13	42	16	1	16
17	14	16	17	1	52
18	14	50	18	2	29
19	15	24	19	3	06
20	15	58	20	3	43
21	16	32	21	4	21
22	17	07	22	4	59
23	17	41	23	5	36
24	18	16	24	6	14
25	18	50	25	6	52
26	19	25	26	7	29
27	19	59	27	8	07
28	20	34	28	8	45
29	21	08	29	9	24
30	21	43	30	10	02

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The Table *of the Nonagesime Degree, for the Latitude of* 60 *Degrees, continu'd.*

Cusp 10. *Gemini.* °	Nonagesime. °	′	Cusp 10. *Cancer.* °	Nonagesime. °	′
0	10 ♊	2	0	0 ♋	0
1	10	40	1	0	41
2	11	19	2	1	22
3	11	58	3	2	03
4	12	37	4	2	43
5	13	16	5	3	23
6	13	55	6	4	04
7	14	35	7	4	45
8	15	14	8	5	25
9	15	54	9	6	06
10	16	33	10	6	46
11	17	13	11	7	27
12	17	52	12	8	07
13	18	32	13	8	48
14	19	12	14	9	28
15	19	52	15	10	08
16	20	32	16	10	48
17	21	12	17	11	28
18	21	53	18	12	08
19	22	33	19	12	47
20	23	14	20	13	27
21	23	54	21	14	06
22	24	35	22	14	46
23	25	15	23	15	25
24	25	56	24	16	05
25	26	37	25	16	44
26	27	17	26	17	33
27	27	57	27	18	02
28	28	38	28	18	41
29	29	19	29	19	20
30	0 ♋	0	30	19	58

The Table *of the Nonagesime Degree for the Latitude of* 60 *Degrees, continued.*

Cusp 10. Leo. °	Nonagesime. °	′	Cusp 10. Virgo. °	Nonagesime. °	′
0	19♋	58	0	8 ♌	17
1	20	36	1	8	52
2	21	15	2	9	26
3	21	53	3	10	01
4	22	31	4	10	35
5	23	08	5	11	10
6	23	46	6	11	44
7	24	24	7	12	19
8	25	01	8	12	53
9	25	39	9	13	28
10	26	17	10	14	02
11	26	54	11	14	36
12	27	31	12	15	10
13	28	08	13	15	44
14	28	44	14	16	18
15	29	21	15	16	52
16	29	57	16	17	26
17	0 ♌	34	17	18	0
18	1	10	18	18	34
19	1	46	19	19	08
20	2	22	20	19	42
21	2	58	21	20	16
22	3	34	22	20	49
23	4	10	23	21	23
24	4	45	24	21	57
25	5	21	25	22	31
26	5	56	26	23	05
27	6	32	27	23	39
28	7	07	28	24	13
29	7	42	29	24	47
30	8	17	30	25	21

The

The Table *of the Nonageſime Degree, for the Latitude of 60 Degrees, continu'd.*

Cuſp 10. *Libra.* °	Nona-geſime. ° ′		Cuſp 10. *Scorpio.* °	Nona-geſime. ° ′	
0	25 ♌	21	0	13 ♍	29
1	25	55	1	14	09
2	26	30	2	14	50
3	27	04	3	15	31
4	27	38	4	16	12
5	28	13	5	16	54
6	28	47	6	17	36
7	29	21	7	18	19
8	29	56	8	19	03
9	0 ♍	31	9	19	47
10	1	06	10	20	32
11	1	42	11	21	17
12	2	17	12	22	03
13	2	53	13	22	50
14	3	28	14	23	38
15	4	04	15	24	27
16	4	40	16	25	17
17	5	16	17	26	07
18	5	52	18	26	58
19	6	29	19	27	50
20	7	05	20	28	44
21	7	42	21	29	39
22	8	19	22	0 ♎	35
23	8	57	23	1	32
24	9	53	24	2	31
25	10	13	25	3	32
26	10	52	26	4	34
27	11	31	27	5	38
28	12	10	28	6	43
29	12	49	29	7	51
30	13	29	30	9	01

The Table *of the Nonagesime Degree, for the Latitude of* 60 *Deg ees, continu'd.*

Cusp 10. *Sagittary* °	Nonagesime. °	′	Cusp 10. *Capricorn* °	Nonagesime. °	′
0	9 ♎	1	0	0 ♑	0
1	10	14	1	4	52
2	11	29	2	9	37
3	12	47	3	14	18
4	14	07	4	18	55
5	15	31	5	23	20
6	17	0	6	27	30
7	18	32	7	1 ♒	26
8	20	07	8	5	10
9	21	47	9	8	43
10	23	33	10	12	05
11	25	23	11	15	17
12	27	19	12	18	13
13	29	12	13	20	58
14	1 ♏	35	14	23	36
15	3	55	15	26	05
16	6	24	16	28	25
17	9	02	17	0 ♓	38
18	11	47	18	2	41
19	14	43	19	4	37
20	17	55	20	6	27
21	21	17	21	8	13
22	24	50	22	9	53
23	28	34	23	11	28
24	2 ♐	30	24	13	0
25	6	40	25	14	29
26	11	05	26	15	52
27	15	42	27	17	13
28	20	23	28	18	31
29	25	08	29	19	46
30	0	0	30	20	59

The Table *of the Nonagesime Degree, for the Latitude of 60 Degrees, continued.*

Cusp 10. *Aquarius* °	Nonagesime. ° '	Cusp 10. *Pisces.* °	Nonagesime. ° '
0	20 ♓ 59	0	16 ♈ 61
1	22 09	1	17 11
2	23 17	2	17 50
3	24 22	3	18 29
4	25 26	4	19 08
5	26 28	5	19 47
6	27 29	6	20 25
7	28 28	7	21 03
8	29 25	8	21 41
9	0 ♈ 21	9	22 18
10	1 16	10	22 55
11	2 10	11	23 31
12	3 02	12	24 08
13	3 53	13	24 44
14	4 43	14	25 20
15	5 33	15	25 56
16	6 22	16	26 32
17	7 10	17	27 07
18	7 57	18	27 43
19	8 43	19	28 18
20	9 28	20	28 54
21	10 13	21	29 29
22	10 57	22	08 04
23	11 41	23	0 ♉ 39
24	12 24	24	1 13
25	13 06	25	1 47
26	13 48	26	2 22
27	14 29	27	2 56
28	15 10	28	3 30
29	15 51	29	4 05
30	16 31	30	4 39

A
TABLE
OF THE
ANGLE ORIENT,
OR
Altitude of the Nonagesime Degree.

A Table of the Angle Orient, or Altitude of the Nonagesime Degree.

Ascen.		0		I		Ascen.	
	s	°	'	°	'	°	'
♈	0	66	51	65	31	30	0
	3	66	31	65	51	27	
	6	66	35	65	35	24	
	9	66	45	65	45	21	
	12	66	55	65	55	18	
	15	67	10	66	10	15	
	18	67	30	66	30	12	
	21	67	50	66	50	9	
	24	68	20	67	20	6	
	27	68	45	67	45	3	
♉	0	69	20	68	26	0	♓
	3	69	55	68	55	27	
	6	70	35	69	35	24	
	9	71	15	70	15	21	
	12	72	0	71	0	18	
	15	72	50	71	50	15	
	18	73	45	72	45	12	
	21	74	40	73	40	9	
	24	75	35	74	35	6	
	27	76	35	75	35	3	
♊	0	77	40	76	40	0	♒
	3	78	45	77	45	27	
	6	79	50	78	50	24	
	9	81	05	80	5	21	
	12	82	15	81	15	18	
	15	83	35	82	30	15	
	18	84	50	83	45	12	
	21	86	5	85	0	9	
	24	87	25	86	20	6	
	27	88	40	87	35	3	
♋	0	90	0	88	55	0	♑

Th

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continu'd.*

Ascen.	°	0 °	'	I °	'	Ascen. °	
♋	0	90	0	88	55	30	♑
	3	89	55	89	45	27	
	6	87	25	88	30	24	
	9	86	05	87	10	21	
	12	84	50	85	55	18	
	15	83	35	84	40	15	
	18	82	20	83	25	12	
	21	81	05	82	10	9	
	24	80	05	81	5	6	
	27	78	50	79	55	3	
♌	0	77	35	78	45	0	♐
	3	76	35	77	40	27	
	6	75	35	76	40	24	
	9	74	40	75	45	21	
	12	73	50	74	50	18	
	15	72	55	73	55	15	
	18	72	0	73	5	12	
	21	71	15	72	20	9	
	24	70	30	71	35	6	
	27	70	0	71	0	3	
♍	0	69	25	70	25	0	♏
	3	68	45	69	50	27	
	6	68	20	69	20	24	
	9	67	55	68	55	21	
	12	67	30	68	50	18	
	15	67	05	68	10	15	
	18	66	55	67	55	12	
	21	66	45	67	45	9	
	24	66	35	67	35	6	
	27	66	31	67	31	3	
♎	0	66	31	67	31	0	♎

The

The Table *of the Angle Orient, or Altitude of the Nonagefime Degree, continued.*

Afcen.	°	2 °	'	3 °	'	Afcen. °	
♈	0	64	30	63	30	30	°
	3	64	32	63	32	27	
	6	64	35	63	35	24	
	9	64	45	63	45	21	
	12	64	55	63	55	18	
	15	65	10	64	10	15	
	18	65	30	64	30	12	
	21	65	50	64	50	9	
	24	66	15	65	15	6	
	27	66	45	65	45	3	
♉	0	67	20	66	20	0	♓
	3	67	55	66	55	27	
	6	68	35	67	30	24	
	9	69	15	68	10	21	
	12	70	0	69	0	18	
	15	70	50	69	45	15	
	18	71	40	70	35	12	
	21	72	35	71	30	9	
	24	73	35	72	30	6	
	27	74	35	73	30	3	
♊	0	75	35	74	30	0	♒
	3	76	40	75	35	27	
	6	77	50	76	45	24	
	9	79	0	77	50	21	
	12	80	10	79	05	18	
	15	81	25	80	20	15	
	18	82	40	81	35	12	
	21	83	55	82	50	9	
	24	85	15	84	10	6	
	27	86	30	85	25	3	
♋	0	87	50	86	45	0	♑

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		2		3		Ascen.	
	°	°	'	°	'	°	
♋	0	87	50	86	45	30	♑
	3	89	5	88	0	27	
	6	89	35	89	20	24	
	9	88	15	89	20	21	
	12	87	0	88	5	18	
	15	85	45	86	50	15	
	18	84	30	85	35	12	
	21	83	15	84	20	9	
	24	82	5	83	10	6	
	27	81	0	82	0	3	
♌	0	79	55	80	50	0	♐
	3	78	45	79	50	27	
	6	77	45	78	50	24	
	9	76	45	77	50	21	
	12	75	50	76	50	18	
	15	75	0	76	0	15	
	18	74	10	75	10	12	
	21	73	20	74	25	9	
	24	72	40	73	40	6	
	27	72	0	73	0	3	
♍	0	71	25	72	25	0	♏
	3	70	55	71	50	27	
	6	70	20	71	20	24	
	9	69	55	70	55	21	
	12	69	30	70	30	18	
	15	69	15	70	15	15	
	18	68	55	69	55	12	
	21	68	45	69	45	9	
	24	68	35	69	35	6	
	27	68	31	69	31	3	
♎		68	31	69	31	0	♎

The

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen. °	4 °	4 ′	5 °	5 ′	Ascen. °
♈ 0	62	30	61	30	30 0
3	62	32	61	33	27
6	62	35	61	35	24
9	62	45	61	45	21
12	62	55	61	55	18
15	63	10	62	10	15
18	63	30	62	30	12
21	63	50	62	50	9
24	64	15	63	15	6
27	64	45	63	45	3
♉ 0	65	15	64	15	0 ♓
3	65	50	64	50	27
6	66	30	65	30	24
9	67	10	66	10	21
12	67	55	66	55	18
15	68	45	67	40	15
18	69	35	68	30	12
21	70	30	69	25	9
24	71	25	70	20	6
27	72	25	71	20	3
♊ 0	73	25	72	25	0 ♒
3	74	30	73	30	27
6	75	40	74	40	24
9	76	50	75	50	21
12	78	0	76	50	18
15	79	15	78	10	15
18	80	30	79	05	12
21	81	45	80	40	9
24	83	05	81	55	6
27	84	20	83	15	3
♋ 0	85	40	84	30	0 ♑

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		4		5		Ascen.	
	°	°	′	°	′	°	
♋	0	85	40	84	30	0	♑
	3	86	50	85	50	27	
	6	88	15	87	10	24	
	9	89	30	88	25	21	
	12	89	10	89	45	18	
	15	87	55	89	0	15	
	18	86	40	87	45	12	
	21	85	25	86	30	9	
	24	84	15	85	20	6	
	27	83	5	84	10	3	
♌	0	82	0	83	5	0	♐
	3	80	55	82	0	27	
	6	79	50	80	55	24	
	9	78	55	79	55	21	
	12	77	55	79	0	18	
	15	77	5	78	5	15	
	18	76	15	77	15	12	
	21	75	25	76	30	9	
	24	74	45	75	45	6	
	27	74	5	75	5	3	
♍	0	73	25	74	25	0	♏
	3	72	55	73	55	27	
	6	72	25	73	25	24	
	9	71	55	72	5	21	
	12	71	35	72	35	18	
	15	71	15	72	15	15	
	18	71	0	72	0	12	
	21	70	45	71	45	9	
	24	70	35	71	35	6	
	27	70	30	71	30	3	
♎	0	70	30	71	30	0	♎

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		6		7		Ascen.	
	°	°	'	°	'	°	
♈	0	60	30	59	30	30	0
	3	60	32	59	33	27	
	6	60	35	59	35	24	
	9	60	45	59	45	21	
	12	60	55	59	55	18	
	15	61	10	60	10	15	
	18	61	30	60	30	12	
	21	61	50	60	50	9	
	24	62	15	61	15	6	
	27	62	40	61	40	3	
♉	0	63	15	62	10	0	♓
	3	63	50	62	45	27	
	6	64	25	63	25	24	
	9	65	25	64	5	21	
	12	65	55	64	45	18	
	15	66	35	65	35	15	
	18	67	25	66	25	12	
	21	68	20	67	20	9	
	24	69	20	68	15	6	
	27	70	20	69	15	3	
♊	0	71	20	70	15	0	♒
	3	72	25	71	20	27	
	6	73	35	72	25	24	
	9	74	40	73	35	21	
	12	75	50	74	45	18	
	15	77	5	76	0	15	
	18	78	20	77	15	12	
	21	79	35	78	30	9	
	24	80	50	79	45	6	
	27	82	10	81	5	3	
♋	0	83	25	82	20	0	♑

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.	°	6 °	6 '	7 °	7 '	Ascen. °	
♋	0	83	5	82	20	30	♑
	3	84	45	83	40	27	
	6	86	5	85	0	24	
	9	87	25	86	15	21	
	12	88	35	87	35	18	
	15	89	55	88	50	15	
	18	88	50	89	55	12	
	21	87	35	88	45	9	
	24	86	25	87	30	6	
	27	85	15	86	20	3	
♌	0	84	5	85	10	0	♐
	3	83	0	84	5	27	
	6	82	0	83	0	24	
	9	81	0	82	5	21	
	12	80	5	81	5	18	
	15	79	10	80	10	15	
	18	78	20	79	20	12	
	21	77	30	78	35	9	
	24	76	45	77	50	6	
	27	76	5	77	10	3	
♍	0	75	30	76	30	0	♏
	3	74	55	75	55	27	
	6	74	25	75	25	24	
	9	73	55	74	55	21	
	12	73	30	74	35	18	
	15	73	15	74	15	15	
	18	73	0	74	0	12	
	21	72	45	73	45	9	
	24	72	35	73	35	6	
	27	72	30	73	30	3	
♎		72	30	73	30	0	♎

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		8		9		Ascen.	
	°	°	'	°	'	°	
♈	0	58	30	57	30	30	0
	3	58	32	57	33	27	
	6	58	35	57	35	24	
	9	58	45	57	45	21	
	12	58	55	57	55	18	
	15	59	10	58	10	15	
	18	59	25	58	25	12	
	21	59	45	58	45	9	
	24	60	10	59	0	6	
	27	60	40	59	40	3	
♉	0	61	10	60	10	0	♓
	3	61	45	60	45	27	
	6	62	25	61	20	24	
	9	63	05	62	0	21	
	12	63	45	62	45	18	
	15	64	30	63	30	15	
	18	65	20	64	20	12	
	21	66	15	65	15	9	
	24	67	10	66	10	6	
	27	68	10	67	05	3	
♊	0	69	10	68	05	0	♒
	3	70	15	69	10	27	
	6	71	20	70	15	24	
	9	72	30	71	25	21	
	12	73	40	72	35	18	
	15	74	55	73	50	15	
	18	76	25	75	05	12	
	21	77	25	76	20	9	
	24	78	40	77	35	6	
	27	80	0	78	55	3	
♋	0	81	15	80	10	0	♑

The

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continu'd.*

Ascen.		8		9		Ascen.	
	°	°	'	°	'	°	
♋	0	81	15	80	10	30	♑
	3	82	35	81	30	27	
	6	83	50	82	45	24	
	9	85	10	84	5	21	
	12	86	25	85	20	18	
	15	87	45	86	40	15	
	18	89	0	87	55	12	
	21	89	45	89	10	9	
	24	88	35	89	40	6	
	27	87	25	88	25	3	
♌	0	86	15	87	20	0	♐
	3	85	10	86	15	27	
	6	84	5	85	10	24	
	9	83	5	84	10	21	
	12	82	10	83	10	18	
	15	81	15	82	15	15	
	18	80	25	81	25	12	
	21	79	35	80	35	9	
	24	78	50	79	50	6	
	27	78	10	79	5	3	
♍	0	77	30	78	30	0	♏
	3	76	55	77	55	27	
	6	76	25	77	25	24	
	9	76	0	77	0	21	
	12	75	35	76	35	18	
	15	75	15	76	15	15	
	18	75	0	76	0	12	
	21	74	45	75	45	9	
	24	74	35	75	35	6	
	27	74	30	75	30	3	
♎	0	74	30	75	30	0	♎

The Table *of the Angle Orient, or Altitude of ths Nonagesime Degree, continued.*

Ascen.		10		11		Ascen.	
	°	°	′	°	′	°	
♈	0	56	31	55	31	30	0
	3	56	31	55	31	27	
	6	56	35	55	35	24	
	9	56	45	55	45	21	
	12	56	55	55	55	18	
	15	57	10	56	10	15	
	18	57	25	56	25	12	
	21	57	45	56	45	9	
	24	58	10	57	10	6	
	27	58	40	57	40	3	
♉	0	59	10	58	10	0	♓
	3	59	45	58	45	27	
	6	60	20	59	15	24	
	9	61	0	59	55	21	
	12	61	40	60	40	18	
	15	62	25	61	25	15	
	18	63	15	62	15	12	
	21	64	10	63	05	9	
	24	65	5	64	0	6	
	27	66	5	65	0	3	
♊	0	67	5	66	0	0	♒
	3	68	5	67	05	27	
	6	69	15	68	10	24	
	9	70	20	69	15	21	
	12	71	30	70	25	18	
	15	72	40	71	35	15	
	18	73	55	72	0	12	
	21	75	15	74	10	9	
	24	76	30	75	25	6	
	27	77	45	76	40	3	
♋	0	79	5	78	0	0	♑

A Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen. °	10 °	′	11 °	′	Ascen. °
♋ 0	79	5	78	0	0 ♑
3	80	25	79	20	27
6	81	45	80	35	24
9	82	50	81	55	21
12	84	15	83	10	18
15	85	35	84	30	15
18	86	50	85	45	12
21	88	5	87	0	9
24	89	20	88	15	6
27	89	10	89	25	3
♌ 0	88	25	89	25	0 ♐
3	87	20	88	20	27
6	86	15	87	20	24
9	85	10	86	15	21
12	84	15	85	20	18
15	83	20	84	25	15
18	82	25	83	30	12
21	81	40	82	40	9
24	80	55	81	55	6
27	80	10	81	15	3
♍ 0	79	35	80	35	0 ♏
3	78	55	79	0	27
6	78	25	79	25	24
9	78	0	79	0	21
12	77	35	78	35	18
15	77	15	78	15	15
18	77	0	78	0	12
21	76	45	77	45	9
24	76	35	77	35	6
27	76	30	77	30	3
♎ 0	76	30	77	30	0 ♎

The

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		12		13		Ascen.	
	°	°	′	°	′	°	
♈	0	54	30	53	30	30	0
	3	54	30	53	30	27	
	6	54	35	53	35	24	
	9	54	45	53	45	21	
	12	54	55	53	55	18	
	15	55	10	54	10	15	
	18	55	25	54	25	12	
	21	55	45	54	45	9	
	24	56	10	55	10	6	
	27	56	35	55	35	3	
♉	0	57	5	56	5	0	♓
	3	57	40	56	40	27	
	6	58	15	57	15	24	
	9	58	55	57	50	21	
	12	59	35	58	35	18	
	15	60	25	59	20	15	
	18	61	10	60	10	12	
	21	62	5	61	0	9	
	24	63	0	61	55	6	
	27	63	50	62	50	3	
♊	0	64	55	63	50	0	♒
	3	66	0	64	55	27	
	6	67	5	66	0	24	
	9	68	10	67	5	21	
	12	69	20	68	15	18	
	15	70	30	69	30	15	
	18	71	45	70	40	12	
	21	73	0	71	55	9	
	24	74	20	73	15	6	
	27	75	35	74	30	3	
♋	0	76	55	75	50	0	♑

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.	°	12 °	'	13 °	'	Ascen. °	
♋	0	76	55	75	50	0	♑
	3	78	10	77	5	27	
	6	79	30	78	25	24	
	9	80	50	79	45	21	
	12	82	5	81	0	18	
	15	83	25	82	15	15	
	18	84	40	83	35	12	
	21	85	55	84	50	9	
	24	87	10	86	5	6	
	27	88	20	87	15	3	
♌	0	89	30	88	25	0	♐
	3	89	25	89	35	27	
	6	88	20	89	20	24	
	9	87	20	88	20	21	
	12	86	20	87	25	18	
	15	85	25	86	30	15	
	18	84	35	85	35	12	
	21	83	40	84	45	9	
	24	83	0	84	0	6	
	27	82	15	83	15	3	
♍	0	81	35	82	35	0	♏
	3	81	0	82	0	27	
	6	80	25	81	30	24	
	9	80	0	81	0	21	
	12	79	35	80	35	18	
	15	79	15	80	15	15	
	18	79	0	80	0	12	
	21	78	45	79	45	9	
	24	78	40	79	40	6	
	27	78	31	79	31	3	
♎	0	78	31	79	31	0	♎

A Table *of the Angle Orient, or Altitude of the Nonagesime Degree.*

Ascen. °	14 °	14 ′	15 °	15 ′	Ascen. °
♈ 0	52	31	51	31	0 ♈
3	52	31	51	31	27
6	52	35	51	35	24
9	52	45	51	45	21
12	52	55	51	55	18
15	53	5	52	5	15
18	53	25	52	25	12
21	53	45	52	45	9
24	54	5	53	5	6
27	54	35	53	35	3
♉ 0	55	5	54	0	0 ♓
3	55	35	54	35	27
6	56	10	55	10	24
9	56	50	55	50	21
12	57	30	56	30	18
15	58	15	57	15	15
18	59	5	58	0	12
21	59	55	58	55	9
24	60	50	59	50	6
27	61	50	60	45	3
♊ 0	62	45	61	40	0 ♒
3	63	50	62	45	27
6	64	55	63	50	24
9	66	0	64	55	21
12	67	10	66	5	18
15	68	20	67	15	15
18	69	35	68	30	12
21	70	50	69	45	9
24	72	5	71	0	6
27	73	25	72	20	3
♋ 0	74	40	73	35	0

The

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		14		15		Ascen.	
	°	°	′	°	′	°	
♋	0	74	40	73	35	0	♑
	3	76	0	74	55	27	
	6	77	20	76	15	24	
	9	78	40	77	35	21	
	12	79	55	78	50	18	
	15	81	10	80	5	15	
	18	82	30	81	25	12	
	21	83	0	82	40	9	
	24	85	0	83	55	6	
	27	86	10	85	5	3	
♌	0	87	20	86	15	0	♐
	3	88	30	87	25	27	
	6	89	35	88	30	24	
	9	89	25	89	30	21	
	12	88	25	89	30	18	
	15	87	30	88	35	15	
	18	86	40	87	40	12	
	21	85	45	86	55	9	
	24	85	0	86	5	6	
	27	84	0	85	20	3	
♍	0	83	40	84	40	0	♏
	3	83	0	84	5	27	
	6	82	30	83	20	24	
	9	82	0	83	0	21	
	12	81	35	82	40	18	
	15	81	15	82	20	15	
	18	81	0	82	0	12	
	21	80	45	81	45	9	
	24	80	40	81	40	6	
	27	80	31	81	31	3	
♎	0	80	31	81	31	0	♎

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		16		17		Ascen.	
	°	°	'	°	'	°	
♈	0	50	31	49	31	0	♈
	3	50	31	49	31	27	
	6	50	35	49	35	24	
	9	50	50	49	40	21	
	12	50	50	49	50	18	
	15	51	5	50	5	15	
	18	51	25	50	25	12	
	21	51	45	50	40	9	
	24	52	5	51	5	6	
	27	53	30	51	30	3	
♉	0	53	0	52	0	0	♓
	3	53	35	52	30	27	
	6	54	10	53	5	24	
	9	54	45	53	45	21	
	12	55	25	54	20	18	
	15	56	10	55	5	15	
	18	56	55	55	55	12	
	21	57	50	56	45	9	
	24	58	45	57	45	6	
	27	59	40	58	40	3	
♊	0	60	40	59	35	0	♒
	3	61	40	60	35	27	
	6	62	45	61	40	24	
	9	63	50	62	45	21	
	12	65	0	63	55	18	
	15	66	10	65	5	15	
	18	67	25	66	20	12	
	21	68	40	67	35	9	
	24	69	45	68	50	6	
	27	71	15	70	5	3	
♋	0	72	30	71	25	0	♑

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen. °		16 °	′	17 °	′	Ascen. °	
♋	0	72	30	71	25	0	♑
	3	73	0	72	45	27	
	6	75	10	74	0	24	
	9	76	25	75	20	21	
	12	77	45	76	40	18	
	15	79	0	77	50	15	
	18	80	20	79	15	12	
	21	81	35	80	30	9	
	24	82	50	81	45	6	
	27	84	0	82	50	3	
♌	0	85	10	84	10	0	♐
	3	86	20	85	15	27	
	6	87	25	86	20	24	
	9	88	30	87	25	21	
	12	89	25	88	25	18	
	15	89	40	89	20	15	
	18	88	45	89	45	12	
	21	87	50	88	50	9	
	24	87	0	88	5	6	
	27	86	20	87	25	3	
♍	0	85	40	86	45	0	♏
	3	85	5	86	5	27	
	6	84	30	85	35	24	
	9	84	5	85	5	21	
	12	83	40	84	40	18	
	15	83	20	84	20	15	
	18	83	0	84	0	12	
	21	82	45	83	45	9	
	24	82	40	83	40	6	
	27	82	31	83	31	3	
♎	0	82	31	83	31	0	♎

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.	°	18 °	'	19 °	'	Ascen. °	
♈	0	48	31	47	31	0	♈
	3	48	31	47	31	27	
	6	48	35	47	35	24	
	9	48	40	47	40	21	
	12	48	50	47	50	18	
	15	49	5	48	5	15	
	18	49	25	48	20	12	
	21	49	40	48	40	9	
	24	50	5	49	5	6	
	27	50	30	49	30	3	
♉	0	51	0	49	50	0	♓
	3	51	33	50	30	27	
	6	52	5	51	5	24	
	9	52	40	51	40	21	
	12	53	25	52	20	18	
	15	54	5	53	5	15	
	18	54	55	53	50	12	
	21	55	45	54	40	9	
	24	56	35	55	30	6	
	27	57	30	6	25	3	
♊	0	58	30	57	25	0	♒
	3	59	30	58	25	27	
	6	60	35	59	30	24	
	9	61	40	60	35	21	
	12	62	50	61	45	18	
	15	64	0	62	55	15	
	18	65	15	64	10	12	
	21	66	30	65	20	9	
	24	67	45	66	40	6	
	27	69	0	67	55	3	
♋	0	70	20	69	10	0	♑

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.	18		19		Ascen.	
°	°	′	°	′	°	
♋ 0	70	20	69	10	0	♑
3	71	35	70	30	27	
6	72	55	71	50	24	
9	74	15	73	10	21	
12	75	35	74	25	18	
15	76	50	75	45	15	
18	78	5	77	0	12	
21	79	25	78	20	9	
24	80	40	79	35	6	
27	81	55	80	45	3	
♌ 0	83	5	82	0	0	♐
3	84	10	83	5	27	
6	85	15	84	15	24	
9	86	20	85	15	21	
12	87	20	86	20	18	
15	88	15	87	15	15	
18	89	15	88	10	12	
21	89	55	89	5	9	
24	89	10	89	50	6	
27	88	25	89	25	3	
♍ 0	87	45	88	45	0	♏
3	87	10	88	10	27	
6	86	35	87	35	24	
9	86	5	87	5	21	
12	85	40	86	40	18	
15	85	20	86	20	15	
18	85	0	86	0	12	
21	84	45	85	45	9	
24	84	40	85	40	6	
27	84	31	85	31	3	
♎ 0	84	31	85	31	0	♎

The

The Table *of the* Angle Orient, *or* Altitude *of the* *Nonagesime Degree, continued.*

Ascen.		20		21		Ascen.	
	°	°	′	°	′	°	
♈	0	46	31	45	31	0	♈
	3	46	31	45	31	27	
	6	46	35	45	35	24	
	9	46	40	45	40	21	
	12	46	50	45	50	18	
	15	47	05	46	5	15	
	18	47	20	46	20	12	
	21	47	40	46	40	9	
	24	48	5	47	0	6	
	27	48	25	47	25	3	
♉	0	48	55	47	55	0	♓
	3	49	25	48	25	27	
	6	50	0	49	0	24	
	9	50	40	49	35	21	
	12	51	15	50	15	18	
	15	52	0	50	55	15	
	18	52	45	51	40	12	
	21	53	35	52	30	9	
	24	54	30	53	25	6	
	27	5[illegible]	25	54	20	3	
♊	0	56	20	5[illegible]	15	0	♒
	3	57	20	56	35	27	
	6	58	25	[illegible]7	20	24	
	9	59	30	58	25	21	
	12	60	40	59	35	18	
	15	61	5[illegible]	60	4[illegible]	15	
	18	63	0	61	50	12	
	21	64	15	63	10	9	
	24	65	30	64	2[illegible]	6	
	27	66	50	6[illegible]	40	3	
♋	0	68	5	67	0	0	♑

The

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continu'd.*

Ascen.		20		21		Ascen.	
	°	°	′	°	′	°	
♋	0	68	5	67	0	0	♑
	3	69	25	68	20	27	
	6	70	45	69	40	24	
	9	72	5	70	55	21	
	12	73	20	72	15	18	
	15	74	40	73	35	15	
	18	75	55	74	50	12	
	21	77	15	76	10	9	
	24	78	30	77	25	6	
	27	79	40	78	40	3	
♌	0	80	55	79	50	0	♐
	3	82	5	81	0	27	
	6	83	5	82	5	24	
	9	84	15	83	10	21	
	12	85	15	84	10	18	
	15	86	15	85	10	15	
	18	87	10	86	5	12	
	21	88	0	87	0	9	
	24	88	50	87	45	6	
	27	89	35	88	30	3	
	0	89	45	89	10	0	♏
	3	89	10	89	50	27	
	6	88	35	89	35	24	
	9	88	5	89	5	21	
	12	87	40	88	40	18	
	15	87	20	88	20	15	
	18	87	0	88	0	12	
	21	86	45	87	45	9	
	24	86	40	87	40	6	
	27	86	31	87	31	3	
♎	0	86	31.	87	31	0	♎

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.	°	22 °	′	23 °	′	Ascen. °	
♈	0	44	31	43	31	30	♈
	3	44	31	43	31	27	
	6	44	35	43	35	24	
	9	44	40	43	40	21	
	12	44	50	43	50	18	
	15	45	5	44	5	15	
	18	45	20	44	20	12	
	21	45	40	44	40	9	
	24	46	0	45	0	6	
	27	46	25	45	25	3	
♉	0	46	50	45	50	0	♓
	3	47	25	46	25	27	
	6	48	0	46	55	24	
	9	48	35	47	30	21	
	12	49	10	48	10	18	
	15	49	55	48	50	15	
	18	50	40	49	35	12	
	21	51	30	50	25	9	
	24	52	20	51	20	6	
	27	53	15	52	10	3	
♊	0	54	10	53	5	0	♒
	3	55	10	54	5	27	
	6	56	15	55	10	24	
	9	57	20	56	15	21	
	12	58	25	57	20	18	
	15	59	35	58	30	15	
	18	60	50	59	45	12	
	21	62	5	60	55	9	
	24	63	20	62	15	6	
	27	64	35	63	30	3	
♋	0	65	55	64	45	0	♑

The Table *of the Angle Orient, or Altitude of the* Nonagesime *Degree, continued.*

Ascen.	22		23		Ascen.	
°	°	′	°	′	°	
♋ 0	65	55	64	45	0	♑
3	67	10	66	5	27	
6	68	30	67	25	24	
9	69	50	68	45	21	
12	71	10	70	5	18	
15	72	30	71	10	15	
18	73	45	72	40	12	
21	75	5	74	0	9	
24	76	20	75	15	6	
27	77	35	76	30	3	
♌ 0	78	45	77	40	0	♐
3	79	0	78	50	27	
6	81	55	80	0	24	
9	82	5	81	5	21	
12	83	10	82	5	18	
15	84	5	83	5	15	
18	85	5	84	0	12	
21	85	55	84	55	9	
24	86	45	85	40	6	
27	87	30	86	25	3	
♍ 0	88	30	87	10	0	♏
3	88	50	87	45	27	
6	89	25	88	20	24	
9	89	55	88	50	21	
12	89	40	89	15	18	
15	89	20	89	40	15	
18	89	0	89	55	12	
21	88	45	89	45	9	
24	88	40	89	40	6	
27	88	31	89	31	3	
♎ 0	88	31	89	31	0	♎

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.	23° 29′		24.		Ascen.
°	°	′	°	′	°
♈ 0	43	2	42	31	0 ♈
3	43	2	42	31	27
6	43	5	42	35	24
9	43	10	42	40	21
12	43	20	42	50	18
15	43	35	43	5	15
18	43	50	43	20	12
21	44	5	43	35	9
24	44	25	43	55	6
27	44	50	44	20	3
♉ 0	45	20	45	50	0 ♓
3	45	50	45	20	27
6	46	25	45	50	24
9	47	0	46	25	21
12	47	35	47	5	18
15	48	15	47	55	15
18	49	5	48	30	12
21	49	50	49	20	9
24	50	45	50	15	6
27	51	35	51	5	3
♊ 0	52	30	52	0	0 ♒
3	53	30	53	0	27
6	54	35	54	5	24
9	55	40	55	10	21
12	56	50	56	15	18
15	58	0	57	30	15
18	59	10	58	40	12
21	60	20	59	50	9
24	61	35	61	5	6
27	62	50	62	20	3
♋ 0	64	10	63	45	0 ♑

The

The Table *of the* Angle Orient, *or* Altitude *of the Nonagesime Degree, continued.*

Ascen.		23° 29′		24		Ascen.	
	°	°	′	°	′	°	
♋	0	64	10	63	45	0	♑
	3	65	30	65	0	27	
	6	66	50	66	20	24	
	9	68	10	67	35	21	
	12	69	30	68	55	18	
	15	70	45	70	15	15	
	18	72	5	71	35	12	
	21	73	25	72	50	9	
	24	74	40	74	10	6	
	27	75	55	75	25	3	
♌	0	77	5	76	35	0	♐
	3	78	15	77	45	27	
	6	79	20	78	50	24	
	9	80	30	80	0	21	
	12	81	33	81	0	18	
	15	82	30	82	0	15	
	18	83	30	83	0	12	
	21	84	20	83	50	9	
	24	85	10	84	40	6	
	27	85	55	85	25	3	
♍	0	86	35	86	10	0	♏
	3	87	15	86	45	27	
	6	87	55	87	20	24	
	9	88	20	87	50	21	
	12	88	45	88	15	18	
	15	89	10	88	35	15	
	18	89	25	88	55	12	
	21	89	40	89	15	9	
	24	89	50	89	20	6	
	27	89	55	89	29	3	
♎	0	90	0	89	29	0	♎

The Table *of the Angle Orient, or Altitude of ths* Nonagesime *Degree, continued.*

Ascen.	25		26		Ascen.
°	°	′	°	′	°
♈ 0	41	31	40	31	0 ♈
3	41	31	40	31	27
6	41	35	40	35	24
9	41	40	40	40	21
12	41	50	40	50	18
15	42	5	41	5	15
18	42	20	41	20	12
21	42	35	41	35	9
24	42	55	41	55	6
27	43	20	42	20	3
♉ 0	43	50	42	45	0 ♓
3	44	20	43	15	27
6	44	50	43	50	24
9	45	25	44	25	21
12	46	5	45	0	18
15	46	45	45	40	15
18	47	30	46	25	12
21	48	20	47	15	9
24	49	10	48	5	6
27	50	0	48	55	3
♊ 0	50	55	49	50	0 ♒
3	51	55	50	50	27
6	53	0	51	55	24
9	54	5	52	55	21
12	55	10	54	5	18
15	56	20	55	15	15
18	57	30	56	25	12
21	58	45	57	35	9
24	60	0	58	50	6
27	61	15	60	10	3
♋ 0	62	35	61	25	0 ♑

The

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen. °	25 °	′	26 °	′	Ascen. °
♋ 0	62	35	61	25	0 ♑
3	63	50	62	45	27
6	65	10	64	5	24
9	66	30	65	25	21
12	67	50	66	45	18
15	69	30	68	5	15
18	70	30	69	25	12
21	71	45	70	40	9
24	73	5	71	55	6
27	74	15	73	15	3
♌ 0	75	30	74	25	0 ♐
3	76	45	75	35	27
6	77	50	76	45	24
9	78	55	77	50	21
12	80	0	78	55	18
15	81	0	79	50	15
18	81	50	80	50	12
21	82	50	81	45	9
24	83	35	82	35	6
27	84	25	83	20	3
♍ 0	85	5	84	5	0 ♏
3	85	45	84	40	27
6	86	20	85	15	24
9	86	50	85	50	21
12	87	15	86	15	18
15	87	40	86	35	15
18	87	55	86	55	12
21	88	15	87	15	9
24	88	20	87	20	6
27	88	29	87	29	3
♎ 0	88	29	87	29	0 ♎

The

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.	°	27 °	′	28 °	′	Ascen. °	
♈	0	39	31	38	31	0	♈
	3	39	31	38	31	27	
	6	39	35	38	35	24	
	9	39	40	38	40	21	
	12	39	50	38	50	18	
	15	40	5	39	5	15	
	18	40	20	39	20	12	
	21	40	35	39	35	9	
	24	40	55	39	55	6	
	27	41	20	40	15	3	
♉	0	41	45	40	45	0	♓
	3	42	15	41	10	27	
	6	42	45	41	45	24	
	9	43	20	42	20	21	
	12	43	55	42	55	18	
	15	44	35	43	35	15	
	18	45	20	44	15	12	
	21	46	10	45	5	9	
	24	47	15	45	50	6	
	27	47	45	26	40	3	
♊	0	48	50	47	40	0	♒
	3	49	55	48	40	27	
	6	51	0	49	40	24	
	9	52	0	50	45	21	
	12	53	0	51	50	18	
	15	54	0	53	0	15	
	18	55	15	54	10	12	
	21	56	30	55	25	9	
	24	57	55	56	35	6	
	27	59	0	57	55	3	
♋	0	60	20	59	10	0	♑

The

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.	27		28		Ascen.
°	°	′	°	′	°
♋ 0	60	20	59	10	0 ♑
3	61	40	60	30	27
6	63	0	61	50	24
9	64	15	63	10	21
12	65	35	64	30	18
15	66	55	65	50	15
18	68	15	67	10	12
21	69	50	68	30	9
24	70	35	69	45	6
27	72	10	71	0	3
♌ 0	73	20	72	15	0 ♐
3	74	30	73	25	27
6	75	40	74	35	24
9	76	50	75	45	21
12	77	50	76	45	18
15	78	50	77	50	15
18	79	50	78	40	12
21	80	45	79	45	9
24	81	35	80	30	6
27	82	20	81	20	3
♍ 0	83	5	82	0	0 ♏
3	83	40	82	40	27
6	84	15	83	15	24
9	84	50	83	50	21
12	85	15	84	15	18
15	85	35	84	35	15
18	85	55	84	55	12
21	86	15	85	15	9
24	86	20	85	20	6
27	86	29	85	29	3
♎ 0	86	29	85	29	0 ♎

A Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.	29		30		Ascen.	
°	°	′	°	′	°	′
♈ 0	37	31	36	31	0	♈
3	37	31	36	31	27	
6	37	35	36	35	24	
9	37	40	36	40	21	
12	37	50	36	50	18	
15	38	0	37	0	15	
18	38	15	37	15	12	
21	38	35	37	35	9	
24	38	55	37	50	6	
27	39	15	38	15	3	
♉ 0	39	40	38	40	0	♓
3	40	10	39	10	27	
6	40	40	39	40	24	
9	41	15	40	15	21	
12	41	55	40	50	18	
15	42	30	41	30	15	
18	43	15	42	10	12	
21	44	0	42	55	9	
24	44	50	43	45	6	
27	45	40	44	35	3	
♊ 0	46	35	45	30	0	♒
3	47	35	46	30	27	
6	48	35	47	30	24	
9	49	40	48	30	21	
12	50	45	49	40	18	
15	51	50	50	45	15	
18	53	5	51	55	12	
21	54	15	53	10	9	
24	55	30	54	25	6	
27	56	45	55	40	3	
♋ 0	58	5	57	0	0	♑

The

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		29		30		Ascen.	
	°	°	'	°	'	°	
♋	0	58	5	57	0	0	♑
	3	59	25	58	15	27	
	6	60	45	59	35	24	
	9	62	5	60	55	21	
	12	63	25	62	15	18	
	15	64	45	63	35	15	
	18	66	5	64	55	12	
	21	67	20	66	15	9	
	24	68	40	67	35	6	
	27	69	55	68	50	3	
♌	0	70	10	70	5	0	♐
	3	72	20	71	15	27	
	6	73	30	72	30	24	
	9	74	40	73	35	21	
	12	75	45	74	40	18	
	15	76	45	75	40	15	
	18	77	45	76	40	12	
	21	78	40	77	35	9	
	24	79	30	78	25	6	
	27	80	15	79	15	3	
♍	0	81	0	80	0	0	♏
	3	81	40	80	40	27	
	6	82	15	81	15	24	
	9	82	45	81	45	21	
	12	83	15	82	15	18	
	15	83	45	82	40	15	
	18	83	55	82	55	12	
	21	84	5	83	10	9	
	24	84	20	83	20	6	
	27	84	29	83	29	3	
♎	0	84	29	83	29	0	♎

The Table *of the* Angle Orient, *or* Altitude *of the* *Nonagesime* *Degree, continued.*

Ascen.		31		32		Ascen.	
	°	°	′	°	′	°	
♈	0	35	31	34	31	0	♈
	3	35	31	34	31	27	
	6	35	35	34	35	24	
	9	35	40	34	40	21	
	12	35	50	34	50	18	
	15	36	0	35	0	15	
	18	36	15	35	15	12	
	21	36	35	35	30	9	
	24	36	50	35	50	6	
	27	37	15	36	10	3	
♉	0	37	40	36	35	0	♓
	3	38	5	37	5	27	
	6	38	35	37	55	24	
	9	39	10	38	10	21	
	12	39	45	38	45	18	
	15	40	25	39	25	15	
	18	41	10	40	5	12	
	21	41	50	40	45	9	
	24	42	40	41	35	6	
	27	43	30	42	25	3	
♊	0	44	20	43	20	0	♒
	3	45	25	44	15	27	
	6	46	20	45	15	24	
	9	47	25	46	20	21	
	12	48	30	47	25	18	
	15	49	40	48	30	15	
	18	50	0	49	40	12	
	21	52	50	50	55	9	
	24	53	15	52	10	6	
	27	54	30	53	25	3	
♋	0	55	50	54	40	0	♑

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen. °		31 °	′	32 °	′	Ascen. °	
♋	0	55	50	54	40	0	♑
	3	57	10	56	0	27	
	6	58	30	57	20	24	
	9	59	50	58	40	21	
	12	61	10	60	5	18	
	15	62	30	61	20	15	
	18	63	50	62	40	12	
	21	65	10	64	5	9	
	24	66	25	65	20	6	
	27	67	45	66	40	3	
♌	0	69	0	67	55	0	♐
	3	70	10	69	5	27	
	6	71	25	70	20	24	
	9	72	30	71	25	21	
	12	73	35	72	30	18	
	15	74	35	73	35	15	
	18	75	35	74	40	12	
	21	76	30	75	30	9	
	24	77	25	76	20	6	
	27	78	10	77	10	3	
♍	0	78	55	77	55	0	♏
	3	79	35	78	35	27	
	6	80	15	79	10	24	
	9	80	45	79	45	21	
	12	81	15	80	15	18	
	15	81	35	80	35	15	
	18	81	55	80	55	12	
	21	82	10	81	10	9	
	24	82	20	81	20	6	
	27	82	29	81	29	3	
♎	0	82	29	81	29	0	♎

The

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		33		34		Ascen.	
	°	°	'	°	'	°	
♈	0	33	31	32	31	0	♈
	3	33	31	32	31	27	
	6	33	35	32	35	24	
	9	33	40	32	40	21	
	12	33	50	32	50	18	
	15	34	0	33	0	15	
	18	34	15	33	15	12	
	21	34	30	33	31	9	
	24	34	50	33	50	6	
	27	35	10	34	10	3	
♉	0	35	35	34	35	0	♓
	3	36	0	35	0	27	
	6	36	30	35	30	24	
	9	37	5	36	0	21	
	12	37	40	36	35	18	
	15	38	20	37	15	15	
	18	39	0	37	55	12	
	21	39	45	38	40	9	
	24	40	30	39	25	6	
	27	41	20	40	15	3	
♊	0	42	15	41	10	0	♒
	3	43	10	42	5	27	
	6	44	10	43	5	24	
	9	45	15	44	5	21	
	12	46	15	45	10	18	
	15	47	25	46	15	15	
	18	48	35	47	25	12	
	21	49	40	48	35	9	
	24	51	0	49	50	6	
	27	52	15	51	5	3	
♋	0	53	35	52	25	0	♑

The

The Table *of the* Angle Orient, *or Altitude of the Nonagesime Degree, continued.*

Ascen.	°	33 °	'	34 °	'	Ascen. °	
♋	0	53	35	52	25	0	♑
	3	54	50	53	45	27	
	6	56	10	55	5	24	
	9	57	35	56	25	21	
	12	58	55	57	45	18	
	15	60	15	59	5	15	
	18	61	35	60	30	12	
	21	62	55	61	50	9	
	24	64	15	63	5	6	
	27	65	30	64	25	3	
♌	0	66	50	65	40	0	♐
	3	68	0	66	55	27	
	6	69	15	68	10	24	
	9	70	25	69	20	21	
	12	71	30	70	25	18	
	15	72	30	71	25	15	
	18	73	30	72	25	12	
	21	74	25	73	25	9	
	24	75	20	74	15	6	
	27	76	10	75	5	3	
♍	0	76	55	75	50	0	♏
	3	77	35	76	35	27	
	6	78	10	77	10	24	
	9	78	45	77	40	21	
	12	79	10	78	10	18	
	15	79	35	78	35	15	
	18	79	55	78	55	12	
	21	80	10	79	10	9	
	24	80	20	79	20	6	
	27	80	29	79	29	3	
♎	0	80	29	79	29	0	♎

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.	°	35 °	'	36 °	'	Ascen. °	
♈	0	31	31	30	31	0	♈
	3	31	31	30	31	27	
	6	31	35	30	35	24	
	9	31	40	30	40	21	
	12	31	50	30	50	18	
	15	32	0	31	0	15	
	18	32	15	31	10	12	
	21	32	30	31	30	9	
	24	32	45	31	45	6	
	27	33	30	32	5	3	
♉	0	33	50	32	30	0	♓
	3	34	0	32	55	27	
	6	34	25	33	25	24	
	9	35	0	33	55	21	
	12	35	35	34	30	18	
	15	36	20	35	5	15	
	18	36	50	35	45	12	
	21	37	35	36	30	9	
	24	38	20	37	15	6	
	27	39	30	38	5	3	
♊	0	40	0	38	55	0	♒
	3	41	0	39	50	27	
	6	41	55	40	50	24	
	9	43	0	41	60	21	
	12	44	0	42	50	18	
	15	45	5	44	0	15	
	18	46	15	45	10	12	
	21	47	30	46	20	9	
	24	48	45	47	35	6	
	27	50	0	48	30	3	
♋	0	51	15	49	10	0	♑

The

The Table *of the Angle Orient, or Altitude of the* Nonagesime *Degree, continu'd.*

Ascen.	35		36		Ascen.
°	°	′	°	′	°
♋ 0	51	15	50	10	0 ♑
3	52	15	51	25	27
6	53	55	52	45	24
9	55	15	54	10	21
12	56	40	55	30	18
15	58	0	56	50	15
18	59	20	58	15	12
21	60	40	59	35	9
24	62	0	60	55	6
27	63	20	62	10	3
♌ 0	64	35	63	30	0 ♐
3	65	50	64	45	27
6	67	5	66	0	24
9	68	15	67	10	21
12	69	20	68	15	18
15	70	20	69	20	15
18	71	25	70	20	12
21	72	20	71	20	9
24	73	15	72	10	6
27	74	5	73	0	3
♍ 0	74	50	73	45	0 ♏
3	75	30	74	30	27
6	76	10	75	10	24
9	76	40	75	40	21
12	77	10	76	10	18
15	77	35	76	35	15
18	77	55	76	55	12
21	78	10	77	10	9
24	78	20	77	20	6
27	78	29	77	29	3
♎ 0	78	29	77	29	0 ♎

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		37		38		Ascen.	
	°	°	'	°	'	°	
♈	0	29	31	28	31	0	♈
	3	29	31	28	31	27	
	6	29	35	28	35	24	
	9	29	40	28	40	21	
	12	29	50	28	45	18	
	15	30	0	29	0	15	
	18	30	10	29	10	12	
	21	30	25	29	25	9	
	24	30	45	29	45	6	
	27	31	5	30	0	3	
♉	0	31	25	30	25	0	♓
	3	31	50	30	50	27	
	6	32	20	31	20	24	
	9	32	55	31	50	21	
	12	33	25	32	20	18	
	15	34	0	32	55	15	
	18	34	40	33	35	12	
	21	35	25	34	20	9	
	24	36	10	35	5	6	
	27	37	0	35	50	3	
♊	0	37	50	36	40	0	♒
	3	38	45	37	40	27	
	6	39	40	38	35	24	
	9	40	45	39	35	21	
	12	41	45	40	35	18	
	15	42	50	41	40	15	
	18	44	0	42	50	12	
	21	45	10	44	0	9	
	24	46	25	45	15	6	
	27	47	40	46	30	3	
♋	0	49	0	47	50	0	♑

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.	°	37 °	′	38 °	′	Ascen. °	
♋	0	49	0	47	50	0	♑
	3	50	15	49	10	27	
	6	51	40	50	30	24	
	9	53	20	51	50	21	
	12	54	20	53	10	18	
	15	55	20	54	35	15	
	18	57	5	55	55	12	
	21	58	20	56	20	9	
	24	59	20	58	40	6	
	27	61	5	60	0	3	
♌	0	62	25	61	15	0	♐
	3	63	40	62	30	27	
	6	64	55	63	45	24	
	9	66	5	65	0	21	
	12	67	10	66	5	18	
	15	68	35	67	10	15	
	18	69	35	68	10	12	
	21	70	35	69	10	9	
	24	71	10	70	5	6	
	27	72	0	70	55	3	
♍	0	72	45	71	45	0	♏
	3	73	30	72	25	27	
	6	74	5	73	5	24	
	9	74	40	73	40	21	
	12	75	10	74	10	18	
	15	75	35	74	35	15	
	18	75	55	74	55	12	
	21	76	10	75	10	9	
	24	76	20	75	20	6	
	27	76	29	75	29	3	
♎	0	76	29	75	29	0	♎

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.	°	39 °	39 ′	40 °	40 ′	Ascen. °	
♈	0	27	31	26	31	0	♈
	3	27	31	26	31	27	
	6	27	35	26	35	24	
	9	27	40	26	40	21	
	12	27	45	26	45	18	
	15	28	0	26	55	15	
	18	28	10	27	10	12	
	21	28	25	27	25	9	
	24	28	40	27	40	6	
	27	29	0	28	0	3	
♉	0	29	25	28	20	0	♓
	3	29	50	28	45	27	
	6	30	25	29	15	24	
	9	30	45	29	40	21	
	12	31	20	30	15	18	
	15	31	55	30	55	15	
	18	32	35	31	30	12	
	21	33	15	32	10	9	
	24	33	55	32	50	6	
	27	34	45	33	40	3	
♊	0	35	35	34	30	0	♒
	3	36	30	35	25	27	
	6	37	25	36	20	24	
	9	38	25	37	20	21	
	12	39	10	38	20	18	
	15	40	35	39	25	15	
	18	41	40	40	30	12	
	21	42	55	41	45	9	
	24	44	5	42	55	6	
	27	45	20	44	10	3	
♋	0	46	40	45	30	0	♑

The

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.	°	39 °	'	40 °	'	Ascen. °	
♋	0	46	40	45	30	0	♑
	3	48	0	46	50	27	
	6	49	0	48	10	24	
	9	50	40	49	30	21	
	12	52	5	50	55	18	
	15	53	25	52	15	15	
	18	54	45	53	40	12	
	21	56	10	55	0	9	
	24	57	30	56	25	6	
	27	58	50	57	45	3	
♌	0	60	10	59	0	0	♐
	3	61	25	60	20	27	
	6	62	40	61	35	24	
	9	63	55	62	50	21	
	12	65	0	63	50	18	
	15	66	5	65	0	15	
	18	67	10	66	5	12	
	21	68	10	67	5	9	
	24	69	5	68	0	6	
	27	69	55	68	50	3	
♍	0	70	40	69	40	0	♏
	3	71	25	70	25	27	
	6	72	5	71	0	24	
	9	72	35	71	35	21	
	12	73	5	72	5	18	
	15	73	35	72	30	15	
	18	73	55	72	55	12	
	21	74	10	73	10	9	
	24	74	20	73	20	6	
	27	74	29	73	29	3	
♎	0	74	29	73	29	0	♎

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen. °	41 °	′	42 °	′	Ascen. °
♈ 0	25	31	24	31	0 ♈
3	25	31	24	31	27
6	25	35	24	35	24
9	25	40	24	40	21
12	25	45	24	45	18
15	25	55	24	55	15
18	26	10	25	5	12
21	26	25	25	20	9
24	26	40	25	35	6
27	26	55	25	55	3
♉ 0	27	20	26	15	0 ♓
3	27	45	26	40	27
6	28	10	27	5	24
9	28	40	27	35	21
12	29	10	28	5	18
15	29	45	28	40	15
18	30	20	29	15	12
21	31	0	29	55	9
24	31	45	30	40	6
27	32	10	31	25	3
♊ 0	33	20	32	15	0 ♒
3	34	15	33	5	27
6	35	10	34	0	24
9	36	10	35	0	21
12	37	10	36	0	18
15	38	15	37	5	15
18	39	20	38	15	12
21	40	35	39	20	9
24	41	45	40	35	6
27	43	0	41	50	3
♋ 0	44	20	43	10	0 ♑

The

The Table *of the* Angle Orient, *or* Altitude *of the Nonagesime Degree, continued.*

Ascen. °	41 °	41 ′	42 °	42 ′	Ascen. °
♋ 0	44	20	43	20	0 ♑
3	45	40	44	25	27
6	47	0	45	50	24
9	48	20	47	10	21
12	49	45	48	35	18
15	51	5	49	55	15
18	52	30	51	20	12
21	53	0	52	45	9
24	55	15	54	5	6
27	56	35	55	25	3
♌ 0	57	50	56	50	0 ♐
3	59	10	58	5	27
6	60	30	59	25	24
9	61	40	60	35	21
12	62	50	61	4;	18
15	63	55	62	50	15
18	65	0	63	55	12
21	66	0	64	50	9
24	66	55	65	55	6
27	67	50	66	45	3
♍ 0	68	35	67	35	0 ♏
3	69	20	68	20	27
6	70	0	69	0	24
9	70	35	69	35	21
12	71	5	70	5	18
15	71	30	70	30	15
18	71	35	70	55	12
21	72	10	71	10	9
24	72	20	71	20	6
27	72	29	71	29	3
♎ 0	72	29	71	29	0 ♎

The Table *of the Angle Orient, or Altitude of ths Nonagesime Degree, continued.*

Ascen.		43		44		Ascen.	
	°	°	'	°	'	°	
♈	0	23	31	22	31	0	♈
	3	23	31	22	31	27	
	6	23	35	22	35	24	
	9	23	40	22	40	21	
	12	23	45	22	45	18	
	15	23	55	22	55	15	
	18	24	5	23	5	12	
	21	24	20	23	20	9	
	24	24	35	23	35	6	
	27	24	50	23	50	3	
♉	0	25	15	24	10	0	♓
	3	25	40	24	35	27	
	6	26	5	25	0	24	
	9	26	30	25	25	21	
	12	27	0	25	50	18	
	15	27	35	26	30	15	
	18	28	10	27	5	12	
	21	28	50	27	45	9	
	24	29	30	28	25	6	
	27	30	20	29	10	3	
♊	0	31	5	30	0	0	♒
	3	32	0	30	50	27	
	6	32	55	31	45	24	
	9	33	50	32	40	21	
	12	34	50	33	40	18	
	15	35	50	34	45	15	
	18	37	0	35	50	12	
	21	38	10	37	0	9	
	24	39	25	38	15	6	
	27	40	40	39	30	3	
♋	0	41	55	40	45	0	♑

The

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.	°	43 °	'	44 °	'	Ascen. °	
♋	0	41	55	40	45	0	♑
	3	43	15	42	5	27	
	6	44	35	43	25	24	
	9	46	0	44	50	21	
	12	47	25	46	10	18	
	15	48	45	47	35	15	
	18	50	10	49	0	12	
	21	51	5	50	25	9	
	24	52	50	51	45	6	
	27	54	20	53	10	3	
♌	0	55	40	54	30	0	♐
	3	57	0	55	50	27	
	6	58	15	57	10	24	
	9	59	30	58	25	21	
	12	60	40	59	35	18	
	15	61	50	60	40	15	
	18	62	50	61	45	12	
	21	63	55	62	50	9	
	24	64	50	63	45	6	
	27	65	45	64	40	3	
♍	0	66	35	65	30	0	♏
	3	67	15	66	15	27	
	6	67	55	66	55	24	
	9	68	30	67	30	21	
	12	69	5	68	5	18	
	15	69	30	68	30	15	
	18	69	55	68	50	12	
	21	70	10	69	10	9	
	24	70	20	69	20	6	
	27	70	29	69	29	3	
♎	0	70	29	69	29	0	♎

The Table of the Angle Orient, or Altitude of the Nonagesime Degree, continued.

Ascen.		45		46		Ascen.	
	°	°	'	°	'	°	
♈	0	21	31	20	31	0	♈
	3	21	31	20	31	27	
	6	21	35	20	35	24	
	9	21	40	20	40	21	
	12	21	45	20	45	18	
	15	21	50	20	50	15	
	18	22	5	21	5	12	
	21	22	20	21	20	9	
	24	22	30	21	30	6	
	27	22	50	21	50	3	
♉	0	23	10	22	5	0	♓
	3	23	30	22	30	27	
	6	23	55	22	50	24	
	9	24	25	23	20	21	
	12	24	55	23	50	18	
	15	25	25	24	20	15	
	18	26	0	24	55	12	
	21	26	35	25	30	9	
	24	27	20	26	10	6	
	27	28	0	26	55	3	
♊	0	28	50	27	40	0	♒
	3	29	40	28	30	27	
	6	30	35	29	25	24	
	9	31	30	30	20	21	
	12	32	30	31	20	18	
	15	33	35	32	20	15	
	18	34	40	33	25	12	
	21	35	45	34	35	9	
	24	37	0	35	45	6	
	27	38	15	37	0	3	
♋	0	39	30	38	20	0	♑

The Table *of the* Angle Orient, *or Altitude of the Nonagesime Degree, continued.*

Ascen.		45		46		Ascen.	
	°	°	′	°	′	°	
♋	0	39	30	38	20	0	♑
	3	40	50	39	40	27	
	6	42	10	41	0	24	
	9	43	35	42	20	21	
	12	45	0	43	50	18	
	15	46	25	44	10	15	
	18	47	50	46	35	12	
	21	49	15	48	0	9	
	24	50	35	49	25	6	
	27	52	0	50	50	3	
♌	0	53	25	52	15	0	♐
	3	54	45	53	35	27	
	6	56	0	54	55	24	
	9	57	15	56	10	21	
	12	58	30	57	20	18	
	15	59	40	58	30	15	
	18	60	45	59	40	12	
	21	61	45	60	40	9	
	24	62	45	61	40	6	
	27	63	40	62	35	3	
♍	0	64	30	63	25	0	♏
	3	65	15	64	10	27	
	6	65	55	64	55	24	
	9	66	30	65	30	21	
	12	67	0	66	0	18	
	15	67	30	66	30	15	
	18	67	50	66	50	12	
	21	68	10	67	10	9	
	24	68	20	67	20	6	
	27	68	29	67	29	3	
♎	0	68	29	67	29	0	♎

A Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.	47		48		Ascen.	
♈ °	°	′	°	′	°	
♈ 0	19	31	18	31	0	♈
3	19	31	18	31	27	
6	19	35	18	35	24	
9	19	40	18	40	21	
12	19	45	18	45	18	
15	19	50	18	50	15	
18	20	0	19	0	12	
21	20	15	19	15	9	
24	20	30	19	25	6	
27	20	45	19	45	3	
♉ 0	21	5	20	0	0	♓
3	21	25	20	20	27	
6	21	50	20	45	24	
9	22	15	21	10	21	
12	22	45	21	35	18	
15	23	15	22	10	15	
18	23	45	22	40	12	
21	24	25	23	15	9	
24	25	0	23	55	6	
27	25	45	24	35	3	
♊ 0	26	10	25	20	0	♒
3	27	20	26	10	27	
6	28	15	27	0	24	
9	29	30	27	55	21	
12	30	5	28	55	18	
15	31	10	29	55	15	
18	32	15	31	0	12	
21	33	20	32	10	9	
24	34	35	33	20	6	
27	35	50	34	35	3	
♋ 0	37	5	35	55	0	♑

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.	°	47 °	′	48 °	′	Ascen. °	
♋	0	37	5	35	55	0	♑
	3	38	25	37	10	27	
	6	39	45	38	30	24	
	9	41	10	39	55	21	
	12	42	35	41	20	18	
	15	44	0	42	45	15	
	18	45	25	44	15	12	
	21	46	50	45	40	9	
	24	48	15	47	5	6	
	27	49	40	48	30	3	
♌	0	51	5	49	55	0	♐
	3	52	25	51	15	27	
	6	53	45	52	40	24	
	9	55	5	53	55	21	
	12	56	15	55	5	18	
	15	57	25	56	20	15	
	18	58	40	57	25	12	
	21	59	25	58	10	9	
	24	60	35	59	35	6	
	27	61	30	60	30	3	
♍	0	62	20	61	20	0	♏
	3	63	10	62	5	27	
	6	63	50	62	50	24	
	9	64	30	63	25	21	
	12	65	0	64	0	18	
	15	65	30	64	25	15	
	18	65	50	64	50	12	
	21	66	10	65	10	9	
	24	66	20	65	20	6	
	27	66	29	65	29	3	
♎	0	66	29	65	29	0	♎

The Table *of the* Angle Orient, *or* Altitude *of the Nonagesime Degree, continued.*

Ascen.	°	49 °	49 ′	50 °	50 ′	Ascen. °	
♈	0	17	31	16	31	0	♈
	3	17	31	16	31	27	
	6	17	35	16	35	24	
	9	17	40	16	40	21	
	12	17	45	16	45	18	
	15	17	50	16	50	15	
	18	18	0	17	0	12	
	21	18	10	17	10	9	
	24	18	25	17	25	6	
	27	18	40	17	40	3	
♉	0	19	0	18	0	0	♓
	3	19	20	18	15	27	
	6	19	40	18	35	24	
	9	20	5	19	0	21	
	12	20	50	19	25	18	
	15	21	0	19	50	15	
	18	21	30	20	25	12	
	21	22	5	21	0	9	
	24	22	45	21	35	6	
	27	23	25	22	15	3	
♊	0	24	10	23	0	0	♒
	3	25	0	23	45	27	
	6	25	50	24	35	24	
	9	26	45	25	30	21	
	12	27	45	26	25	18	
	15	28	40	27	25	15	
	18	29	45	28	30	12	
	21	30	55	29	35	9	
	24	32	5	30	50	6	
	27	33	20	32	5	3	
♋	0	34	35	33	20	0	♑

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		49		50		Ascen.	
	°	°	′	°	′	°	
♋	0	34	35	33	20	0	♑
	3	35	55	34	40	27	
	6	37	15	36	0	24	
	9	38	40	37	25	21	
	12	40	10	38	50	18	
	15	41	35	40	20	15	
	18	43	0	41	45	12	
	21	44	25	43	15	9	
	24	45	55	44	20	6	
	27	47	20	46	5	3	
♌	0	48	45	47	35	0	♐
	3	50	10	48	55	27	
	6	51	30	50	20	24	
	9	52	45	51	40	21	
	12	54	0	52	55	18	
	15	55	10	54	5	15	
	18	56	20	55	15	12	
	21	57	25	56	20	9	
	24	58	30	57	25	6	
	27	59	25	58	20	3	
♍	0	60	15	59	15	0	♏
	3	61	5	60	0	27	
	6	61	45	60	45	24	
	9	62	25	61	25	21	
	12	63	0	61	55	18	
	15	63	25	62	25	15	
	18	63	55	62	50	12	
	21	64	10	63	10	9	
	24	64	20	63	20	6	
	27	64	29	63	29	3	
♎	0	64	29	63	29	0	♎

The

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		51		52		Ascen.	
	°	°	′	°	′	°	
♈	0	15	31	14	31	0	♈
	3	15	31	14	31	27	
	6	15	35	14	31	24	
	9	15	40	14	35	21	
	12	15	45	14	40	18	
	15	15	50	14	45	15	
	18	16	0	14	55	12	
	21	16	10	15	10	9	
	24	16	20	15	20	6	
	27	16	35	15	30	3	
♉	0	16	50	15	50	0	♓
	3	17	15	16	10	27	
	6	17	10	16	25	24	
	9	17	55	16	50	21	
	12	18	20	17	15	18	
	15	18	45	17	40	15	
	18	19	15	18	10	12	
	21	19	50	18	40	9	
	24	20	25	19	15	6	
	27	21	5	19	55	3	
♊	0	21	50	20	35	0	♒
	3	22	35	21	20	27	
	6	23	25	22	10	24	
	9	24	15	23	0	21	
	12	25	10	23	55	18	
	15	26	10	24	55	15	
	18	27	15	25	55	12	
	21	28	20	27	5	9	
	24	29	30	28	15	6	
	27	30	45	29	30	3	
♋	0	32	5	30	45	0	♑

The Table *of* toq Angle Orient, *or Altitued. of the Nonagesime Degree, continued.*

Ascen. °	51 °	'	52 °	'	Asceu °
♋ 0	32	5	30	45	0 ♑
3	33	20	32	5	27
6	34	45	33	25	24
9	36	10	34	50	21
12	37	35	36	20	18
15	39	5	37	45	15
18	40	30	39	15	12
21	42	0	40	45	9
24	43	25	42	15	6
27	44	50	43	40	3
♌ 0	46	20	45	10	0 ♐
3	47	45	46	35	27
6	49	10	48	0	24
9	50	10	49	20	21
12	51	45	50	35	18
15	53	0	51	50	15
18	54	10	53	5	12
21	55	15	54	10	9
24	56	20	55	15	6
27	57	15	56	15	3
♍ 0	58	10	57	5	0 ♏
3	59	0	57	55	27
6	59	45	58	40	24
9	60	20	59	20	21
12	60	55	59	55	18
15	61	25	60	25	15
18	62	50	60	50	12
21	62	10	61	5	9
24	62	20	61	20	6
27	62	29	61	29	3
♎ 0	62	29	61	29	0 ♎

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		53		54		Ascen.	
	°	°	'	°	'	°	
♈	0	13	31	12	31	0	♈
	3	13	31	12	31	27	
	6	13	31	12	31	24	
	9	13	35	12	35	21	
	12	13	40	12	40	18	
	15	13	55	12	45	15	
	18	13	55	12	55	12	
	21	14	5	13	5	9	
	24	14	15	13	15	6	
	27	14	30	13	30	3	
♉	0	14	45	13	40	0	♓
	3	15	5	14	0	27	
	6	15	20	14	15	24	
	9	15	45	14	35	21	
	12	16	10	15	0	18	
	15	16	35	15	25	15	
	18	17	0	15	50	12	
	21	17	30	16	20	9	
	24	18	5	16	55	6	
	27	18	45	17	30	3	
♊	0	19	25	18	10	0	♒
	3	20	5	18	55	27	
	6	20	50	19	40	24	
	9	21	45	20	30	21	
	12	22	40	21	20	18	
	15	23	35	22	20	15	
	18	24	40	23	20	12	
	21	25	45	24	25	9	
	24	26	55	25	35	6	
	27	28	10	26	50	3	
♋	0	29	25	28	5	0	♑

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continu'd.*

Ascen.		53		54		Ascen.	
	°	°	'	°	'	°	
♋	0	29	25	28	5	0	♑
	3	30	45	29	25	27	
	6	32	10	30	45	24	
	9	33	35	32	10	21	
	12	35	0	33	40	18	
	15	36	30	35	10	15	
	18	38	0	36	40	12	
	21	39	30	38	10	9	
	24	41	0	39	40	6	
	27	42	25	41	15	3	
♌	0	43	55	42	45	0	♐
	3	45	25	44	10	27	
	6	46	50	45	35	24	
	9	48	10	47	0	21	
	12	49	30	48	20	18	
	15	50	45	49	35	15	
	18	52	0	50	50	12	
	21	53	5	52	0	9	
	24	54	10	53	5	6	
	27	55	10	54	5	3	
♍	0	56	4	55	0	0	♏
	3	56	55	55	50	27	
	6	57	40	56	35	24	
	9	58	20	57	15	21	
	12	58	55	57	55	18	
	15	59	25	58	20	15	
	18	59	50	58	45	12	
	21	60	5	59	5	9	
	24	60	20	59	20	6	
	27	60	29	59	29	3	
♎	0	60	29	59	29	0	♎

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.	°	55 °	'	56 °	'	Ascen. °	
♈	0	11	31	10	31	0	♈
	3	11	31	10	31	27	
	6	11	31	10	31	24	
	9	11	35	10	35	21	
	12	11	40	10	40	18	
	15	11	45	10	45	15	
	18	11	55	10	50	12	
	21	12	0	11	0	9	
	24	12	10	11	10	6	
	27	12	25	11	20	3	
♉	0	12	40	11	35	0	♓
	3	12	55	11	50	27	
	6	13	10	12	5	24	
	9	13	30	12	20	21	
	12	13	50	12	40	18	
	15	14	15	13	5	15	
	18	14	40	13	30	12	
	21	15	10	14	0	9	
	24	15	46	14	30	6	
	27	16	20	15	5	3	
♊	0	16	55	15	40	0	♒
	3	16	35	16	20	27	
	6	18	20	17	5	24	
	9	19	10	17	50	21	
	12	20	0	18	40	18	
	15	21	0	19	35	15	
	18	21	55	20	35	12	
	21	23	[illegible]0	21	40	9	
	24	24	10	22	50	6	
	27	25	25	24	5	3	
♋	0	26	40	25	15	0	♑

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen. °		55 °	′	56 °	′	Ascen. °	
♋	0	26	40	25	15	0	♑
	3	28	0	26	40	27	
	6	29	25	28	5	24	
	9	30	50	29	30	21	
	12	32	15	30	55	18	
	15	33	50	32	30	15	
	18	35	20	34	0	12	
	21	36	50	35	35	9	
	24	38	25	37	5	6	
	27	40	0	38	40	3	
♌	0	41	30	40	15	0	♐
	3	42	54	41	40	27	
	6	44	25	43	10	24	
	9	45	55	44	35	21	
	12	47	30	46	0	18	
	15	48	25	47	20	15	
	18	49	40	48	35	12	
	21	50	55	49	40	9	
	24	52	0	50	50	6	
	27	53	0	51	55	3	
♍	0	53	55	52	50	0	♏
	3	54	45	53	45	27	
	6	55	35	54	30	24	
	9	56	15	55	15	21	
	12	56	55	55	50	18	
	15	57	20	56	20	15	
	18	57	45	56	45	12	
	21	58	5	57	5	9	
	24	58	20	57	20	6	
	27	58	29	57	29	3	
♎	0	58	29	57	29	0	♎

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		57		58		Ascen.	
	°	°	′	°	′	°	
♈	0	9	31	8	31	0	♈
	3	9	31	8	31	27	
	6	9	31	8	31	24	
	9	9	35	8	35	21	
	12	9	40	8	40	18	
	15	9	45	8	45	15	
	18	9	50	8	50	12	
	21	9	55	8	55	9	
	24	10	5	9	5	6	
	27	10	15	9	15	3	
♉	0	10	30	9	25	0	♓
	3	10	45	9	40	27	
	6	11	0	9	50	24	
	9	11	15	10	5	21	
	12	11	35	10	25	18	
	15	11	55	10	45	15	
	18	12	20	11	5	12	
	21	12	50	11	35	9	
	24	13	15	12	0	6	
	27	13	50	12	30	3	
♊	0	14	20	13	5	0	♒
	3	15	0	13	40	27	
	6	15	45	14	20	24	
	9	16	30	15	5	21	
	12	17	20	15	20	18	
	15	18	15	16	45	15	
	18	19	10	17	45	12	
	21	20	15	18	45	9	
	24	21	25	19	55	6	
	27	22	35	21	5	3	
♋	0	23	50	22	20	0	♑

The

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen. °	57 °	'	58 °	'	Ascen. °
♋ 0	23	50	22	20	0 ♑
3	25	10	23	40	27
6	26	35	25	5	24
9	28	0	26	35	21
12	29	10	28	5	18
15	31	5	29	35	15
18	32	35	31	10	12
21	34	10	32	50	9
24	35	45	34	25	6
27	37	25	36	0	3
♌ 0	38	55	37	40	0 ♐
3	40	30	39	10	27
6	41	55	40	40	24
9	43	25	42	10	21
12	44	50	43	35	18
15	46	10	44	50	15
18	47	25	46	15	12
21	48	40	47	30	9
24	49	45	48	40	6
27	50	55	49	45	3
♍ 0	51	50	50	45	0 ♏
3	52	40	51	35	27
6	53	30	52	25	24
9	54	10	53	10	21
12	54	50	53	45	18
15	55	20	54	15	15
18	55	45	54	45	12
21	56	5	55	5	9
24	56	20	55	20	6
27	56	29	55	29	3
♎ 0	56	29	55	29	0 ♎

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		59		60		Ascen.	
	°	°	'	°	'	°	
♈	0	7	31	6	31	0	♈
	3	7	31	6	31	27	
	6	7	21	6	31	24	
	9	7	35	6	35	21	
	12	7	40	6	40	18	
	15	7	45	6	45	15	
	18	7	50	6	45	12	
	21	7	55	6	50	9	
	24	8	0	7	0	6	
	27	8	10	7	5	3	
♉	0	8	23	7	15	0	♓
	3	8	35	7	25	27	
	6	8	45	7	35	24	
	9	9	0	7	50	21	
	12	9	15	8	5	18	
	15	9	30	8	25	15	
	18	9	55	8	40	12	
	21	10	20	9	10	9	
	24	10	55	9	25	6	
	27	11	35	9	55	3	
♊	0	11	10	10	20	0	♒
	3	12	55	10	55	27	
	6	13	45	11	35	24	
	9	13	40	12	10	21	
	12	14	25	12	55	18	
	15	15	20	13	45	15	
	18	16	15	14	40	12	
	21	17	15	15	40	9	
	24	18	20	16	45	6	
	27	19	30	17	55	3	
♋	0	20	45	19	10	0	♑

The

The Table of the Angle Orient, or Altitude of the Nonagesime Degree, continued.

Ascen.	59		60		Ascen.	
°	°	′	°	′	°	
♋ 0	20	45	19	10	0	♑
3	22	10	20	35	27	
6	23	0	22	0	24	
9	25	35	23	35	21	
12	26	35	25	0	18	
15	28	10	26	40	15	
18	29	45	28	15	12	
21	31	25	29	55	9	
24	33	0	31	35	6	
27	34	40	33	15	3	
♌ 0	36	20	34	55	0	♐
3	37	50	36	30	27	
6	39	25	38	5	24	
9	40	50	39	40	21	
12	42	25	41	10	18	
15	43	45	42	35	15	
18	45	10	43	55	12	
21	46	20	45	15	9	
24	47	30	46	25	6	
27	48	35	47	30	3	
♍ 0	49	40	48	35	0	♏
3	50	30	49	30	27	
6	51	25	50	20	24	
9	52	5	51	5	21	
12	52	45	51	40	18	
15	53	15	52	15	15	
18	53	45	52	45	12	
21	54	5	53	5	9	
24	54	20	53	20	6	
27	54	29	53	29	3	
♎ 0	54	29	53	29	0	♎

A Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.	°	61 °	′	62 °	′	Ascen. °	′
♈	0	5	31	4	31	0	♈
	3	5	31	4	31	27	
	6	5	31	4	31	24	
	9	5	31	4	31	21	
	12	5	35	4	35	18	
	15	5	40	4	40	15	
	18	5	40	4	40	12	
	21	5	45	4	45	9	
	24	5	55	4	50	6	
	27	6	0	4	55	3	
♉	0	6	10	5	5	0	♓
	3	6	20	5	10	27	
	6	6	30	5	20	24	
	9	6	45	5	30	21	
	12	6	50	5	40	18	
	15	7	10	5	55	15	
	18	7	25	6	10	12	
	21	7	45	6	25	9	
	24	8	10	6	45	6	
	27	8	30	7	10	3	
♊	0	9	0	7	30	0	♒
	3	9	30	8	0	27	
	6	10	5	8	30	24	
	9	10	40	9	5	21	
	12	11	20	9	40	18	
	15	12	10	10	25	15	
	18	13	0	11	15	12	
	21	14	0	12	15	9	
	24	15	5	13	15	6	
	27	16	15	14	25	3	
♋	0	17	25	15	35	0	♑

The Table *of the* Angle Orient, *or Altitude of the Nonagesime Degree, continued.*

Ascen.		61		62		Ascen.	
	°	°	'	°	'	°	
♋	0	17	25	15	30	0	♑
	3	18	50	17	0	27	
	6	20	15	18	25	24	
	9	21	45	20	0	21	
	12	23	20	21	40	18	
	15	25	0	23	20	15	
	18	26	40	25	5	12	
	21	28	20	26	45	9	
	24	30	5	28	10	6	
	27	31	50	30	20	3	
♌	0	33	30	32	5	0	♐
	3	35	15	33	50	27	
	6	36	50	35	30	24	
	9	38	25	37	5	21	
	12	49	55	38	40	18	
	15	41	25	40	10	15	
	18	42	45	41	35	12	
	21	44	5	42	50	9	
	24	45	20	44	5	6	
	27	46	25	45	15	3	
♍	0	47	25	46	20	0	♏
	3	48	20	47	0	27	
	6	49	20	48	10	24	
	9	50	0	49	0	21	
	12	51	40	49	40	18	
	15	51	15	50	15	15	
	18	51	40	50	40	12	
	21	52	0	51	0	9	
	24	52	15	51	15	6	
	27	52	25	51	25	3	
♎	0	52	29	51	29	0	♎

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		63		64		Ascen.	
	°	°	′	°	′	°	
♈	0	3	31	2	31	0	♈
	3	3	31	2	31	27	
	6	3	31	2	31	24	
	9	3	31	2	31	21	
	12	3	35	2	31	18	
	15	3	35	2	35	15	
	18	3	35	2	35	12	
	21	3	40	2	35	9	
	24	3	45	2	40	6	
	27	3	50	2	45	3	
♉	0	3	55	2	50	0	♓
	3	4	0	2	55	27	
	6	4	10	3	0	24	
	9	4	15	3	5	21	
	12	4	25	3	15	18	
	15	4	40	3	20	15	
	18	4	50	3	30	12	
	21	5	5	3	45	9	
	24	5	25	3	55	6	
	27	5	40	4	10	3	
♊	0	6	0	4	25	0	♒
	3	6	25	4	45	27	
	6	6	55	5	10	24	
	9	7	20	5	35	21	
	12	8	0	6	5	18	
	15	8	40	6	45	15	
	18	9	25	7	20	12	
	21	10	15	8	10	9	
	24	11	15	9	5	6	
	27	12	25	10	10	3	
♋	0	13	40	11	25	0	♑

Th

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		63		64		Ascen.	
	°	°	′	°	′	°	
♋	0	13	40	11	25	0	♑
	3	15	0	12	45	27	
	6	16	30	14	15	24	
	9	18	5	15	55	21	
	12	19	45	17	40	18	
	15	21	30	19	30	15	
	18	23	15	21	25	12	
	21	25	5	23	15	9	
	24	26	55	25	30	6	
	27	28	45	27	5	3	
♌	0	30	35	29	0	0	♐
	3	32	20	30	50	27	
	6	34	5	32	40	24	
	9	35	45	34	20	21	
	12	37	20	36	0	18	
	15	38	50	37	35	15	
	18	40	15	39	5	12	
	21	41	40	40	30	9	
	24	42	50	41	45	6	
	27	44	10	43	0	3	
♍	0	45	15	44	5	0	♏
	3	46	15	45	5	27	
	6	47	5	46	0	24	
	9	47	55	46	50	21	
	12	48	35	47	35	18	
	15	49	10	48	10	15	
	18	49	40	48	40	12	
	21	50	0	49	0	9	
	24	50	15	49	15	6	
	27	50	25	49	25	3	
♎	0	50	29	49	29	0	♎

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		65		66		Ascen.	
	°	°	′	°	′	°	
♈	0	1	31	0	31	0	♈
	3	1	31	0	31	27	
	6	1	31	0	31	24	
	9	1	31	0	31	21	
	12	1	31	0	31	18	
	15	1	31	0	31	15	
	18	1	35	0	31	12	
	21	1	35	0	31	9	
	24	1	35	0	31	6	
	27	1	40	0	31	3	
♉	0	1	40	0	35	0	♓
	3	1	45	0	35	27	
	6	1	45	0	35	24	
	9	1	50	0	35	21	
	12	1	55	0	40	18	
	15	2	0	0	40	15	
	18	2	10	0	40	12	
	21	2	15	0	45	9	
	24	2	25	0	45	6	
	27	2	35	0	50	3	
♊	0	2	45	0	55	0	♒
	3	3	0	1	0	27	
	6	3	15	1	10	24	
	9	3	30	1	15	21	
	12	3	55	1	20	18	
	15	4	20	1	40	15	
	18	4	55	1	55	12	
	21	5	40	2	20	9	
	24	6	35	2	55	6	
	27	7	35	3	45	3	
♋	0	8	40	4	50	0	♑

The

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		65		66		Ascen.	
	°	°	'	°	'	°	
♋	0	8	40	4	50	0	♑
	3	10	0	6	20	27	
	6	11	35	8	10	24	
	9	13	25	10	5	21	
	12	15	20	12	20	18	
	15	17	15	14	30	15	
	18	19	15	16	45	12	
	21	21	15	19	0	9	
	24	23	15	21	10	6	
	27	25	15	23	20	3	
♌	0	27	20	25	30	0	♐
	3	29	15	27	35	27	
	6	31	10	29	35	24	
	9	32	55	31	25	21	
	12	34	35	33	15	18	
	15	36	15	34	55	15	
	18	37	45	36	30	12	
	21	39	15	38	0	9	
	24	40	40	40	20	6	
	27	41	55	40	40	3	
♍	0	44	0	41	50	0	♏
	3	44	0	42	55	27	
	6	45	55	43	55	24	
	9	45	50	44	45	21	
	12	46	35	45	25	18	
	15	47	10	46	5	15	
	18	47	40	46	35	12	
	21	48	0	47	0	9	
	24	48	15	47	15	6	
	27	48	25	47	25	3	
♎	0	48	29	47	29	0	♎

The Table *of the* Angle Orient, *or* Altitude *of the* *Nonagesime Degree, continued.*

Ascen.	°	66° 31′ °	′	67 °	′	Ascen. °	
♈	0	The Nonagesime Degree leaps in a Moment from the End of *Virgo* in the West, to the Beginning of *Aries* in the East.		0	29	0	♈
	3			0	29	27	
	6			0	31	24	
	9			0	31	21	
	12			0	31	18	
	15			0	31	15	
	18			0	31	12	
	21			0	31	9	
	24			0	31	6	
	27			0	31	3	
♉	0			0	35	0	♓
	3			0	35	27	
	6			0	35	24	
	9			0	35	21	
	12			0	40	18	
	15			0	40	15	
	18			0	40	12	
	21			0	45	9	
	24			0	45	6	
	27			0	50	3	
♊	0			0	55	0	♒
	3			1	0	27	
	6			1	10	24	
	9			1	15	21	
	12			1	20	18	
	15			1	40	15	
	18			1	55	12	
	21			2	20	9	
	24			3	55	6	
	27			3	45	3	
♋	0			4	50	0	♑

The

The Table *of the* Angle Orient, *or Altitude of the Nonagesime Degree, continued.*

Ascen.		66° 31′		67		Ascen.	
	°	°	′	°	′	°	
♋	0					0	♑
	3	2	35			27	
	6	5	10			24	
	9	7	45	5	5	21	
	12	10	20	6	0	18	
	15	12	50	10	20	15	
	18	15	20	13	25	12	
	21	17	45	16	5	9	
	24	19	5	18	40	6	
	27	22	20	21	5	3	
♌	0	24	35	23	30	0	♐
	3	26	45	25	45	27	
	6	28	45	27	50	24	
	9	30	40	29	50	21	
	12	32	30	31	40	18	
	15	34	10	32	25	15	
	18	35	50	35	5	12	
	21	37	25	36	45	9	
	24	38	45	38	15	6	
	27	40	5	39	15	3	
♍	0	41	20	40	40	0	♏
	3	42	25	41	45	27	
	6	43	20	42	45	24	
	9	44	15	43	40	21	
	12	45	0	44	30	18	
	15	45	40	45	5	15	
	18	46	10	45	35	12	
	21	46	30	46	0	9	
	24	46	45	46	15	6	
	27	46	55	46	25	3	
♎	0	46	58	46	29	0	♎

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		68		69		Ascen.	
	°	°	′	°	′	°	
♈	0	1	29	2	29	0	♈
	3	1	31	2	31	27	
	6	1	31	2	31	24	
	9	1	35	2	35	21	
	12	1	35	2	35	18	
	15	1	35	2	35	15	
	18	1	35	2	40	12	
	21	1	40	2	45	9	
	24	1	40	2	50	6	
	27	1	45	2	55	3	
♉	0	1	45	3	0	0	♓
	3	1	50	3	5	27	
	6	1	55	3	15	24	
	9	2	0	3	25	21	
	12	2	10	3	35	18	
	15	2	15	3	45	15	
	18	2	25	4	5	12	
	21	2	30	4	25	9	
	24	2	45	4	50	6	
	27	3	0	5	25	3	
♊	0	3	25	6	30	0	♒
	3	3	55	8	30	27	
	6	4	45	10	50	24	
	9	6	35			21	
	12	8	45			18	
	15					15	
	18					12	
	21					9	
	24					6	
	27					3	
♋	0					0	♑

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		68		69		Ascen.	
	°	°	′	°	′	°	
♋	0					0	♑
	3					27	
	6					24	
	9					21	
	12					18	
	15					15	
	18	8	45			12	
	21	11	10			9	
	24	15	20	10	50	6	
	27	18	25	13	55	3	
♌	0	21	10	18	5	0	♐
	3	23	45	21	20	27	
	6	26	5	24	0	24	
	9	28	10	26	15	21	
	12	30	0	28	20	18	
	15	31	50	30	20	15	
	18	33	40	32	15	12	
	21	35	25	34	0	9	
	24	36	55	35	40	6	
	27	38	20	36	5	3	
♍	0	39	30	38	20	0	♏
	3	40	35	39	25	27	
	6	41	35	40	30	24	
	9	42	35	41	25	21	
	12	43	25	42	20	18	
	15	44	5	43	3	15	
	18	44	35	43	35	12	
	21	44	55	43	55	9	
	24	45	10	44	10	6	
	27	45	25	44	25	3	
♎	0	45	29	44	29	0	♎

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.	70		71		Ascen.
°	°	′	°	′	°
♈ 0	3	29	4	29	0 ♈
3	3	29	4	29	27
6	3	35	4	35	24
9	3	35	4	35	21
12	3	35	4	35	18
15	3	40	4	45	15
18	3	45	4	50	12
21	3	50	4	55	9
24	3	55	5	5	6
27	4	0	5	25	3
♉ 0	4	10	5	35	0 ♓
3	5	20	5	40	27
6	5	35	6	0	24
9	6	0	6	20	21
12	6	35	6	45	18
15	7	30	7	25	15
18	9	0	8	10	12
21	12	40	9	20	9
24			11	0	6
27			14	10	3
♊ 0					0 ♒
3					27
6					24
9					21
12					18
15					15
18					12
21					9
24					6
27					3
♋ 0					0 ♑

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continu'd.*

Ascen. °	70 °	′	71 °	′	Ascen. °
♋ 0					0 ♑
3					27
6					24
9					21
12					18
15					15
18					12
21					9
24					6
27					3
♌ 0	12	40			0 ♐
3	17	40	14	10	27
6	21	10	16	55	24
9	24	5	21	20	21
12	26	25	24	35	18
15	28	35	26	35	15
18	30	40	29	5	12
21	32	35	31	0	9
24	34	20	32	40	6
27	35	55	34	25	3
♍ 0	37	10	35	50	0 ♏
3	38	15	37	5	27
6	39	25	38	15	24
9	40	25	39	15	21
12	41	15	40	10	18
15	42	0	40	55	15
18	42	35	41	30	12
21	42	45	41	55	9
24	43	15	42	15	6
27	43	25	42	25	3
♎ 0	43	29	42	29	0 ♎

The Table *of the Angle Orient, or Altitude of the* Nonagesime *Degree, continued.*

Ascen.		72		73		Ascen.	
	°	°	′	°	′	°	
♈	0	5	29	6	29	0	♈
	3	5	29	6	29	27	
	6	5	35	6	35	24	
	9	5	35	6	40	21	
	12	5	35	6	45	18	
	15	5	40	6	50	15	
	18	5	55	7	0	12	
	21	6	5	7	10	9	
	24	6	15	7	25	6	
	27	6	25	7	45	3	
♉	0	6	45	8	5	0	♓
	3	7	5	8	30	27	
	6	7	30	9	5	24	
	9	8	0	9	50	21	
	12	8	40	10	50	18	
	15	9	35	12	35	15	
	18	11	0	16	30	12	
	21	15	45			9	
	24					6	
	27					3	
♊	0					0	♒
	3					27	
	6					24	
	9					21	
	12					18	
	15					15	
	18					12	
	21					9	
	24					6	
	27					3	
♋	0					0	♑

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		72		73		Ascen.	
	°	°	'	°	'	°	
♋	0					0	♑
	3					27	
	6					24	
	9					21	
	12					18	
	15					15	
	18					12	
	21					9	
	24					6	
	27					3	
♌	0					0	♐
	3					27	
	6					24	
	9	15	45			21	
	12	21	25	16	30	18	
	15	24	40	21	40	15	
	18	27	15	25	0	12	
	21	29	20	27	45	9	
	24	31	15	29	45	6	
	27	33	0	31	35	3	
♍	0	34	35	33	15	0	♏
	3	35	55	34	40	27	
	6	37	10	35	55	24	
	9	38	10	37	5	21	
	12	39	5	38	0	18	
	15	39	50	38	45	15	
	18	40	25	39	25	12	
	21	40	50	39	50	9	
	24	41	15	40	15	6	
	27	41	25	40	29	3	
♎	0	41	29	40	29	0	♎

The

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.	°	74 °	74 ′	75 °	75 ′	Ascen. °	
♈	0	7	29	8	29	0	♈
	3	7	29	8	29	27	
	6	7	35	8	35	24	
	9	7	40	8	40	21	
	12	7	45	8	50	18	
	15	7	50	9	0	15	
	18	8	5	9	15	12	
	21	8	20	9	35	9	
	24	8	40	9	55	6	
	27	9	5	10	20	3	
♉	0	9	30	11	0	0	♓
	3	10	0	11	40	27	
	6	10	50	12	55	24	
	9	12	0	15	0	21	
	12	13	50	18	10	18	
	15	17	30			15	
	18					12	
	21					9	
	24					6	
	27					3	
♊	0					0	♒
	3					27	
	6					24	
	9					21	
	12					18	
	15					15	
	18					12	
	21					9	
	24					6	
	27					3	
♋	0					0	♑

The

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.	°	74 °	'	75 °	'	Ascen. °	
♋	0					0	♑
	3					27	
	6					24	
	9					21	
	12					18	
	15					15	
	18					12	
	21					9	
	24					6	
	27					3	
♌	0					0	♐
	3					27	
	6					24	
	9					21	
	12					18	
	15	17	30			15	
	18	22	0	18	10	12	
	21	25	25	22	25	9	
	24	28	0	25	50	6	
	27	30	5	28	20	3	
♍	0	31	50	30	20	0	♏
	3	33	20	32	0	27	
	6	34	40	33	30	24	
	9	35	50	34	40	21	
	12	36	50	35	45	18	
	15	37	40	36	35	15	
	18	38	20	37	20	12	
	21	38	50	37	50	9	
	24	39	15	38	15	6	
	27	39	29	38	29	3	
♎	0	39	29	38	29	0	♎

A Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		76		77		Ascen.	
	°	°	'	°	'	°	'
♈	0	9	29	10	29	0	♈
	3	9	29	10	29	27	
	6	9	35	10	35	24	
	9	9	40	10	45	21	
	12	9	55	11	0	18	
	15	10	10	11	15	15	
	18	10	25	11	35	12	
	21	10	45	12	0	9	
	24	11	10	12	35	6	
	27	11	45	13	30	3	
♉	0	12	40	14	35	0	♓
	3	13	55	16	40	27	
	6	15	55	19	45	24	
	9	19	5			21	
	12					18	
	15					15	
	18					12	
	21					9	
	24					6	
	27					3	
♊	0					0	♒
	3					27	
	6					24	
	9					21	
	12					18	
	15					15	
	18					12	
	21					9	
	24					6	
	27					3	
♋	0					0	♑

The Table *of the* Angle Orient, *or* Altitude *of the* *Nonagesime Degree, continued.*

Ascen.	°	76 °	76 ′	77 °	77 ′	Ascen. °	
♋	0					0	♑
	3					27	
	6					24	
	9					21	
	12					18	
	15					15	
	18					12	
	21					9	
	24					6	
	27					3	
♌	0					0	♐
	3					27	
	6					24	
	9					21	
	12					18	
	15					15	
	18					12	
	21	19	5			9	
	24	22	55	19	45	6	
	27	26	20	23	30	3	
♍	0	28	40	26	45	0	♏
	3	30	40	28	55	27	
	6	32	15	30	45	24	
	9	33	30	32	15	21	
	12	34	35	33	25	18	
	15	35	25	34	20	15	
	18	36	15	35	10	12	
	21	36	45	35	45	9	
	24	37	15	36	10	6	
	27	37	29	36	29	3	
♎	0	37	29	36	29	0	♎

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		78		79		Ascen.	
	°	°	′	°	′	°	
♈	0	11	29	12	29	0	♈
	3	11	29	12	33	27	
	6	11	40	12	40	24	
	9	11	45	12	50	21	
	12	12	5	13	10	18	
	15	12	30	13	35	15	
	18	12	50	14	5	12	
	21	13	20	14	45	9	
	24	14	10	15	50	6	
	27	14	15	17	40	3	
♉	0	17	15	20	55	0	♓
	3	20	25			27	
	6					24	
	9					21	
	12					18	
	15					15	
	18					12	
	21					9	
	24					6	
	27					3	
♊	0					0	♒
	3					27	
	6					24	
	9					21	
	12					18	
	15					15	
	18					12	
	21					9	
	24					6	
	27					3	
♋	0					0	♑

The

The Table *of the* Angle Orient, *or Altitude of the* Nonagesime *Degree, continued.*

Ascen. °		78 °	78 ′	79 °	79 ′	Ascen. °	
♋	0					0	♑
	3					27	
	6					24	
	9					21	
	12					18	
	15					15	
	18					12	
	21					9	
	24					6	
	27					3	
♌	0					0	♐
	3					27	
	6					24	
	9					21	
	12					18	
	15					15	
	18					12	
	21					9	
	24					6	
	27	22	25			3	
♍	0	24	5	20	55	0	♏
	3	27	10	24	45	27	
	6	29	15	27	30	24	
	9	30	45	29	30	21	
	12	32	5	30	50	18	
	15	33	10	32	0	15	
	18	34	5	33	0	12	
	21	34	43	33	40	9	
	24	35	10	34	10	6	
	27	35	29	34	29	3	
♎	0	35	29	34	29	0	♎

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		80		81		Ascen.	
	°	°	'	°	'	°	
♈	0	13	29	14	29	0	♈
	3	13	34	14	35	27	
	6	13	40	14	45	24	
	9	13	55	15	0	21	
	12	14	15	15	25	18	
	15	14	45	16	0	15	
	18	15	25	16	55	12	
	21	16	25	18	25	9	
	24	18	5	21	50	6	
	27	21	25			3	
♉	0					0	♓
	3					27	
	6					24	
	9					21	
	12					18	
	15					15	
	18					12	
	21					9	
	24					6	
	27					3	
♊	0					0	♒
	3					27	
	6					24	
	9					21	
	12					18	
	15					15	
	18					12	
	21					9	
	24					6	
	27					3	
♋	0					0	♑

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.	°	80 °	′	81 °	′	°	Ascen.
♋	0					0	♑
	3					27	
	6					24	
	9					21	
	12					18	
	15					15	
	18					12	
	21					9	
	24					6	
	27					3	
♌	0					0	♐
	3					27	
	6					24	
	9					21	
	12					18	
	15					15	
	18					12	
	21					9	
	24					6	
	27					3	
♍	0					0	♏
	3	21	25			27	
	6	25	15	21	50	24	
	9	27	50	25	49	21	
	12	29	35	28	0	18	
	15	30	55	29	0	15	
	18	31	50	30	0	12	
	21	32	35	31	0	9	
	24	33	5	32	0	6	
	27	33	25	32	0	3	
♎	0	33	29	32	29	0	♎

The Table *of the Angle Orient, or Altitude of the* Nonagesime *Degree, continued.*

Ascen.		82		83		Ascen.	
	°	°	'	°	'	°	
♈	0	15	29	16	29	0	♈
	3	15	35	16	35	27	
	6	15	45	16	50	24	
	9	16	5	17	15	21	
	12	16	46	17	55	18	
	15	17	25	19	5	15	
	18	18	50	22	30	12	
	21	22	10			9	
	24					6	
	27					3	
♉	0					0	♓
♊							♑
♋							♒
♌							
♍	0					0	♏
	3					27	♐
	6					24	
	9	22	10			21	
	12	26	5	22	30	18	
	15	28	10	26	30	15	
	18	29	30	28	20	12	
	21	30	25	29	15	9	
	24	31	5	30	0	6	
	27	31	25	30	25	3	
♎	0	31	29	30	29	0	♎

The Table *of the Angle Orient, or Altitude of the* Nonagesime *Degree, continued.*

Ascen.		84		85		Ascen.	
	°	°	′	°	′	°	
♈	0	17	29	18	29	0	♈
	3	17	35	18	40	27	
	6	17	55	19	0	24	
	9	18	25	19	45	21	
	12	19	25	21	35	18	
	15	21	55	23	0	15	
	18	22	45			12	
	21					9	
	24					6	
	27					3	
♉	0					0	♓
♊							♒
♋							♑
						9	
						6	
♌						3	♐
♍	0					0	♏
	3					27	
	6					24	
	9					21	
	12	22	45			18	
	15	23	40	23	0	15	
	18	26	45	24	35	12	
	21	28	5	26	45	9	
	24	28	55	27	50	6	
	27	29	25	28	20	3	
♎	0	29	29	28	29	0	♎

The Table *of the Angle Orient, or Altitude of the* Nonagesime *Degree, continued.*

Ascen.		86		87		Ascen.	
	°	°	'	°	'	°	
♈	0	19	29	20	29	0	♈
	3	19	40	20	45	27	
	6	20	10	21	35	24	
	9	21	30	23	10	21	
	12	23	10			18	
	15					15	
	18					12	
	21					9	
	24					6	
	27					3	
♉	0					0	♓
♊							♒
♋							♑
♌							
♍	0					0	♐
	3					27	♏
	6					24	
	9					21	
	12					18	
	15					15	
	18	23	10			12	
	21	25	5	23	10	9	
	24	26	40	25	15	6	
	27	27	20	26	15	3	
♎	0	27	29	26	29	0	♎

The Table *of the Angle Orient, or Altitude of the Nonagesim* *Degree, continued.*

Ascen.	°	88 °	′	89 °	′	90 °	′	Ascen. °	
♈	0	21	29	22	29	23	29	0	♈
	3	21	50	23	29			27	
	6	23	25					24	
	9							21	
	12							18	
	15							15	
	18							12	
	21							9	
	24							6	
	27							3	
♉								0	♓
♊									♒
♋									♑
♌									♐
♍	0							0	♏
	3							27	
	6							24	
	9							21	
	12							18	
	15							15	
	18							12	
	21							9	
	24	23	25					6	
	27	25	5	23	29			3	
♎	0	25	29	23	29	23	29	0	♎

Because o ♈ and ♎ are in the Horizon, the Nonagesime Degre is continually in o ♋, going equally thro' all the Paints of the Horizon, from the left Hand to the Right.

Sir Isaac Newton's Table *of Refraction of the Heavenly Bodies.* Phil. Transact. N°. 368.

Appar. Aliit. °	′	Refrac. ′	″	Appar. Altit. °	Refrac. ′	″
0	0	33	45	16	3	4
0	15	30	24	17	2	53
0	20	27	35	18	2	43
0	45	25	11	19	2	34
1	0	23	7	20	2	26
1	15	21	20	21	2	18
1	30	19	46	22	2	11
1	45	18	22	23	2	5
2	0	17	8	24	1	59
2	30	15	2	25	1	54
3	0	13	20	26	1	49
3	30	11	57	27	1	44
4	0	10	48	28	1	40
4	30	9	50	29	1	36
5	0	9	2	30	1	32
5	30	8	21	31	1	28
6	0	7	45	32	1	25
6	30	7	14	33	1	22
7	0	6	47	34	1	19
7	30	6	22	35	1	16
8	0	6	0	36	1	13
8	30	5	40	37	1	21
9	0	5	22	38	1	8
9	30	5	6	39	1	6
10	0	4	52	40	1	4
11	0	4	27	41	1	2
12	0	4	5	42	1	0
13	0	3	47	43	0	58
14	0	3	31	44	0	56
15	0	3	17	45	0	54

Sir Isaac Newton's Table *of Refraction, continued.*

Appar. Altit. °	Refrac. ′	″	Appar. Altit. °	Retrac. ′	″
46	0	52	76	0	14
47	0	50	77	0	13
48	0	48	78	0	12
49	0	47	79	0	11
50	0	45	80	0	10
51	0	44	81	0	9
52	0	42	82	0	8
53	0	40	83	0	7
54	0	39	84	0	6
55	0	38	85	0	5
56	0	36	86	0	4
57	0	35	87	0	3
58	0	34	88	0	2
59	0	32	89	0	1
60	0	31	90	0	0
61	0	30			
62	0	28			
63	0	27			
64	0	26			
65	0	25			
66	0	24			
67	0	23			
68	0	22			
69	0	21			
70	0	20			
71	0	19			
72	0	18			
73	0	17			
74	0	16			
75	0	15			

The

A Table *shewing the true Place of the Sun, answering every Degree of Declination.*

Declin. Sun. °	′	Sun's Place. °	′	″
0	0	0 ♈	0 ♎	0
1	0	2	30	37
2	0	5	1	28
3	0	7	32	48
4	0	10	4	54
5	0	12	38	2
6	0	15	12	27
7	0	17	48	30
8	0	20	26	31
9	0	23	6	53
10	0	25	50	4
11	0	28	36	34
		♉ ♍	♏	♓
12	0	31	27	4
13	0	34	22	8
14	0	37	22	50
15	0	40	30	17
16	0	43	45	58
17	0	47	11	55
18	0	50	50	56
19	0	54	47	15
20	0	59	7	37
		♊ ♌	♐	♒
21	0	64	4	14
22	0	70	3	56
23	0	78	40	50
23	29	90 ♋	0 ♑	0

Note, that these Signs, *viz. Aries*, *Taurus*, *Gemini*, *Cancer*, *Leo*, *Virgo*, are North Declination;

Libra, *Scorpio*, *Sagittary*, *Capricorn*, *Aquarius*, *Pisces* are South Declination.

The greatest, mean, and least daily Motions of ☉ and ☽ are these:

		°	′	″
Sun's	Greatest	1	1	6
	Mean	0	59	8
	Least	0	57	16
Moon's	Great.	15	32	50
	Mean	13	10	35
	Least	11	36	20

The Greatest and least of the ☽ are Variable.

A

A
TABLE
OF THE
Moon's Parallax in Altitude, Longitude, and Latitude.

A Table *of the Moon's Parallax in Altitude.*

Altit. Moon.	The Moon's Horizontal Parallax.									
	53'		54'		55'		56'		57'	
°	'	"	'	"	'	"	'	"	'	"
0	53	0	54	0	55	0	56	0	57	0
1	52	59	53	59	54	59	55	59	56	59
2	52	57	53	57	54	57	55	57	56	57
3	52	55	53	55	54	55	55	55	56	55
4	52	52	53	52	54	51	55	51	56	51
5	52	48	53	47	54	47	55	47	56	47
6	52	43	53	42	54	41	55	41	56	41
7	52	36	53	36	54	35	55	35	56	34
8	52	29	53	28	54	27	55	27	56	26
9	52	21	53	20	54	19	55	19	56	18
10	52	12	53	10	54	9	55	9	56	8
11	52	2	53	0	53	59	54	58	55	57
12	51	51	52	49	53	47	54	46	55	45
13	51	39	52	37	53	35	54	34	55	32
14	51	26	52	23	53	21	54	20	55	18
15	51	12	52	9	53	7	54	6	55	3
16	50	57	51	54	52	52	53	50	54	27
17	50	41	51	39	52	36	53	33	54	30
18	50	24	51	22	52	18	53	15	54	12
19	50	7	51	4	52	0	52	57	53	53
20	49	48	50	45	51	41	52	37	53	33
21	49	29	50	25	51	21	52	17	53	9
22	49	9	50	5	51	0	51	55	52	44
23	48	47	49	44	50	37	51	33	52	19
24	48	25	49	20	50	14	51	9	52	4
25	48	2	48	56	49	51	50	44	51	39
26	47	38	48	32	49	26	50	19	51	13
27	47	13	48	7	49	0	49	54	50	46
28	46	47	47	41	48	33	49	26	50	19
29	46	21	47	14	48	6	48	58	49	51
30	45	54	46	46	47	38	48	29	49	22

The

The Table *of the Moon's Parallax in Altitude, continued.*

The Moon's Horizontal Parallax.

Altit. Moon.	58′		59′		60′		61′		62′	
°	′	″	′	″	′	″	′	″	′	″
0	58	0	59	0	60	0	61	0	62	0
1	57	59	58	59	59	59	60	59	61	59
2	57	57	58	57	59	57	60	57	61	57
3	57	55	58	55	59	55	60	55	61	55
4	57	51	58	52	59	51	60	51	61	51
5	57	47	58	47	59	46	60	46	61	46
6	57	41	58	41	59	40	60	40	61	39
7	57	34	58	34	59	33	60	33	61	32
8	57	25	58	25	59	25	60	24	61	23
9	57	17	58	17	59	16	60	15	61	14
10	57	07	58	07	59	05	60	04	61	03
11	56	55	57	55	58	54	59	52	60	52
12	56	43	57	42	58	41	59	39	60	39
13	56	31	57	29	58	27	59	26	60	25
14	56	17	57	14	58	12	59	11	60	9
15	56	01	56	59	57	57	58	55	59	53
16	55	45	56	42	57	40	58	30	59	35
17	5[illegible]	28	56	25	57	22	58	20	59	17
18	55	09	56	06	57	03	58	0	58	57
19	54	50	55	47	56	44	57	40	58	37
20	54	30	55	26	56	23	57	19	58	15
21	54	09	55	05	56	01	56	57	57	53
22	53	46	54	42	55	38	56	33	57	29
23	53	23	54	19	55	14	56	09	57	04
24	52	59	53	54	54	49	55	43	56	38
25	52	34	53	28	54	23	55	17	56	11
26	52	08	53	01	53	55	54	49	55	43
27	51	41	52	34	53	27	54	21	55	15
28	51	13	52	05	52	58	53	51	54	44
29	50	44	51	36	52	28	53	21	54	13
30	50	14	51	06	51	57	52	49	53	41

The Table *of the Moon's Parallax in Altitude, continued.*

The Moon's Horizontal Parallax.

Altit. Moon.	53′		54′		55′		56′		57′	
°	′	″	′	″	′	″	′	″	′	″
30	45	54	46	46	47	38	48	29	49	22
31	45	26	46	17	47	08	47	59	48	51
32	44	57	45	47	46	38	47	29	48	20
33	44	27	45	17	46	07	46	57	47	48
34	43	57	44	46	45	36	46	25	47	15
35	43	25	44	14	45	04	45	52	46	41
36	42	52	43	41	44	31	45	18	46	07
37	42	19	43	07	43	56	44	43	45	31
38	41	46	42	33	43	20	44	07	44	55
39	41	11	41	58	42	44	43	31	44	17
40	40	36	41	22	42	08	42	54	43	39
41	40	0	40	45	41	30	42	16	43	0
42	39	23	40	08	40	52	41	37	42	21
43	38	46	39	29	40	13	40	57	41	41
44	38	08	38	50	39	34	40	17	41	0
45	37	29	38	10	38	53	39	36	40	18
46	36	49	37	29	38	12	38	54	39	35
47	36	09	36	49	37	40	38	11	38	52
48	35	28	36	08	36	48	37	28	38	08
49	34	46	35	25	36	05	36	44	37	23
50	34	04	34	42	35	21	35	59	36	38
51	33	21	33	59	34	37	35	14	35	52
52	32	38	33	15	33	52	34	29	35	05
53	31	54	32	30	33	06	33	42	34	18
54	31	09	31	44	32	19	32	55	33	30
55	30	24	30	58	31	32	32	07	32	41
56	29	38	30	11	30	45	31	19	31	52
57	28	52	29	24	29	57	30	30	31	02
58	28	05	28	37	29	08	29	40	30	12
59	27	18	27	48	28	19	28	50	29	21
60	26	30	26	59	27	30	27	59	28	30

The

The Table *of the Moon's Parallax in Altitude, continued.*

The Moon's Horizontal Parallax.

Altit. Moon. °	58′ ′	58′ ″	59′ ′	59′ ″	60′ ′	60′ ″	61′ ′	61′ ″	62′ ′	62′ ″
30	50	14	51	06	51	57	52	49	53	41
31	49	43	50	04	51	25	52	17	53	07
32	49	11	50	02	50	52	51	44	52	32
33	48	38	49	28	50	18	51	09	51	58
34	48	05	48	54	49	44	50	44	51	23
35	47	30	48	19	49	08	49	58	50	47
36	46	55	47	44	48	32	49	21	50	09
37	46	19	47	07	47	54	48	43	49	30
38	45	42	46	29	47	16	48	04	48	51
39	45	04	45	51	46	37	47	24	48	10
40	44	26	45	12	45	57	46	44	47	29
41	43	46	44	32	45	16	46	02	46	47
42	43	06	43	51	44	35	45	20	46	04
43	42	25	43	09	43	53	44	37	45	20
44	41	43	42	26	43	10	43	53	44	36
45	41	0	41	43	42	35	43	08	43	50
46	40	17	40	59	41	39	42	22	43	04
47	39	33	40	14	40	55	41	36	42	17
48	38	48	39	29	40	08	40	49	41	29
49	38	03	38	42	39	21	40	01	40	40
50	37	17	37	55	38	34	39	13	59	01
51	36	30	37	07	37	45	38	23	39	01
52	35	42	36	19	36	56	37	33	38	10
53	34	54	35	30	36	06	36	42	37	19
54	34	05	33	41	35	16	35	51	36	27
55	33	16	33	50	34	25	34	59	35	34
56	32	26	32	59	33	34	34	06	34	40
57	31	35	32	08	32	41	33	13	33	46
58	30	44	31	16	31	48	32	19	32	51
59	29	52	30	23	30	54	31	25	31	56
60	28	59	29	30	30	0	30	30	31	0

The Table *of the Moon's Parallax in Altitude, continued.*

The Moon's Horizontal Parallax.

Altit. Moon.	53′		54′		55′		56′		57′	
°	′	″	′	″	′	″	′	″	′	″
60	26	30	26	59	27	30	27	59	28	30
61	25	42	26	10	26	40	27	08	27	38
62	24	53	25	21	25	49	26	17	26	45
63	24	04	24	31	24	58	25	25	25	52
64	23	14	23	40	24	06	24	33	24	59
65	22	24	22	49	23	14	23	40	24	05
66	21	33	21	57	22	22	22	47	23	11
67	20	42	21	05	21	29	21	53	22	16
68	19	51	20	13	20	36	20	58	21	21
69	19	0	19	21	19	43	20	04	20	26
70	18	08	18	28	18	49	19	09	19	30
71	17	16	17	35	17	54	18	14	18	34
72	16	23	16	41	16	59	17	18	17	37
73	15	30	15	48	16	04	16	23	16	40
74	14	37	14	54	15	09	15	27	15	43
75	13	43	13	59	14	14	14	30	14	46
76	12	49	13	04	13	19	13	33	13	48
77	11	55	12	09	12	23	12	36	12	50
78	11	01	11	14	11	26	11	38	11	51
79	10	07	10	19	10	30	10	41	10	53
80	9	12	9	23	9	34	9	44	9	54
81	8	18	8	28	8	37	8	46	8	55
82	7	23	7	32	7	40	7	48	7	55
83	6	29	6	36	6	43	6	50	6	57
84	5	34	5	39	5	46	5	52	5	57
85	4	39	4	43	4	49	4	54	4	58
86	3	43	3	47	3	51	3	55	3	58
87	2	48	2	51	2	54	2	57	2	59
88	1	53	1	55	1	56	1	58	1	59
89	0	59	0	59	0	59	0	59	1	0
90	0	0	0	0	0	0	0	0	0	0

The Table *of the Moon's Parallax in Altitude, continued.*

The Moon's Horizontal Parallax.

Altit. Moon	58′		59′		60′		61′		62′	
°	′	″	′	″	′	″	′	″	′	″
60	28	59	29	30	30	0	30	30	31	0
61	28	07	28	36	29	05	29	34	30	03
62	27	15	27	42	28	10	28	38	29	06
63	26	20	26	47	27	14	27	41	28	08
64	25	25	25	52	26	18	26	44	27	10
65	24	30	24	56	25	21	25	46	26	11
56	23	35	23	59	24	24	24	48	25	13
67	22	39	23	03	23	26	23	50	24	13
68	21	43	22	06	22	29	22	51	23	14
69	20	47	21	09	21	30	21	51	22	13
70	19	50	20	11	20	31	20	51	21	12
71	18	53	19	13	19	32	19	51	20	11
72	17	55	18	14	18	33	18	51	19	09
73	16	57	17	15	17	33	17	50	18	07
74	15	59	16	16	16	33	16	49	17	05
75	15	1	15	16	15	32	15	48	16	02
76	14	2	14	16	14	31	14	46	14	59
77	13	3	13	16	13	30	13	44	13	56
78	12	3	12	16	12	29	12	41	12	53
79	11	4	11	15	11	28	11	39	11	50
80	10	4	10	15	10	26	10	36	10	46
81	9	3	9	14	9	24	9	34	9	42
82	8	2	8	13	8	22	8	30	8	38
83	7	3	7	12	7	20	7	27	7	34
84	6	4	6	10	6	17	6	23	6	30
85	5	4	5	9	5	15	5	20	5	26
86	4	3	4	8	4	12	4	16	4	21
87	3	3	3	6	3	9	3	13	3	16
88	2	2	2	4	2	6	2	9	2	11
89	1	1	1	2	1	3	1	5	1	7
90	0	0	0	0	0	0	0	0	0	0

A Table *of the Moon's Parallax in Longitude.*

The Moon's Horizontal Parallax.

°	1 ′	1 ″	2 ′	2 ″	3 ′	3 ″	4 ′	4 ″	5 ′	5 ″	6 ′	6 ″
0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	0	2	0	3	0	4	0	5	0	6
2	0	2	0	4	0	6	0	8	0	10	0	12
3	0	3	0	6	0	9	0	12	0	15	0	18
4	0	4	0	8	0	13	0	17	0	21	0	25
5	0	5	0	10	0	16	0	21	0	26	0	31
6	0	6	0	13	0	19	0	25	0	32	0	38
7	0	7	0	15	0	22	0	29	0	37	0	44
8	0	8	0	17	0	25	0	33	0	42	0	50
9	0	9	0	19	0	28	0	37	0	47	0	56
10	0	11	0	21	0	31	0	42	0	52	1	2
11	0	12	0	23	0	34	0	46	0	57	1	8
12	0	13	0	25	0	37	0	50	1	2	1	15
13	0	14	0	27	0	40	0	54	1	7	1	21
14	0	15	0	29	0	44	0	58	1	13	1	27
15	0	16	0	31	0	47	1	2	1	18	1	33
16	0	17	0	33	0	50	1	6	1	23	1	39
17	0	18	0	35	0	53	1	10	1	28	1	45
18	0	19	0	37	0	56	1	14	1	33	1	51
19	0	20	0	39	0	59	1	18	1	38	1	57
20	0	21	0	41	1	02	1	22	1	43	2	3
21	0	22	0	43	1	04	1	26	1	47	2	9
22	0	23	0	45	1	07	1	30	1	52	2	15
23	0	24	0	47	1	10	1	34	1	57	2	20
24	0	25	0	49	1	13	1	38	2	2	2	26
25	0	25	0	51	1	16	1	41	2	6	2	32
26	0	26	0	53	1	19	1	45	2	11	2	38
27	0	27	0	54	1	21	1	49	2	16	2	43
28	0	28	0	56	1	24	1	53	2	21	2	49
29	0	29	0	58	1	27	1	56	2	25	2	54
30	0	30	1	0	1	30	2	0	2	30	3	0

The

The Table *of the Moon's Parallax in Longitude, continued.*

The Moon's Horizonsal Parallax.

°	1		2		3		4		5		6	
	'	"	'	"	'	"	'	"	'	"	'	"
30	0	30	1	0	1	30	2	0	2	30	3	0
31	0	31	1	2	1	32	2	3	2	34	3	5
32	0	32	1	4	1	35	2	7	2	39	3	11
33	0	33	1	5	1	38	2	10	2	43	3	16
34	0	34	1	7	1	41	2	14	2	48	3	21
35	0	35	1	9	1	43	2	17	2	52	3	26
36	0	36	1	11	1	46	2	21	2	56	3	32
37	0	36	1	12	1	48	2	25	3	0	3	37
38	0	37	1	14	1	51	2	29	3	5	3	42
39	0	38	1	15	1	53	2	32	3	9	3	46
40	0	38	1	17	1	56	2	34	3	13	3	51
41	0	39	1	18	1	58	2	37	3	17	3	56
42	0	40	1	20	2	0	2	41	3	21	4	1
43	0	41	1	21	2	2	2	44	3	24	4	5
44	0	42	1	23	2	5	2	47	3	28	4	10
45	0	43	1	25	2	7	2	50	3	32	4	14
46	0	43	1	26	2	9	2	53	3	36	4	19
47	0	44	1	27	2	11	2	55	3	39	4	23
48	0	45	1	29	2	13	2	58	3	43	4	27
49	0	56	1	30	2	15	3	1	3	46	4	31
50	0	46	1	32	2	18	3	4	3	50	4	36
51	0	47	1	33	2	20	3	6	3	53	4	40
52	0	48	1	35	2	22	3	9	3	56	4	44
53	0	48	1	36	2	24	3	11	3	59	4	47
54	0	49	1	37	2	26	3	14	4	3	4	51
55	0	49	1	38	2	27	3	16	4	6	4	54
56	0	50	1	39	2	29	3	19	4	9	4	58
57	0	50	1	40	2	31	3	21	4	11	5	1
58	0	51	1	42	2	33	3	24	4	14	5	5
59	0	51	1	43	2	34	3	26	4	17	5	8
60	0	52	1	44	2	36	3	28	4	20	5	12

The

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallox.

°	1 ′	1 ″	2 ′	2 ″	3 ′	3 ″	4 ′	4 ″	5 ′	5 ″	6 ′	6 ″
60	0	52	1	44	2	36	3	28	4	20	5	12
61	0	52	1	45	2	38	3	30	4	22	5	15
62	0	53	1	46	2	39	3	32	4	25	5	18
63	0	53	1	47	2	40	3	34	4	27	5	21
64	0	53	1	48	2	42	3	36	4	30	5	24
65	0	54	1	49	2	43	3	37	4	32	5	26
66	0	54	1	50	2	44	3	39	4	34	5	29
67	0	55	1	51	2	45	3	40	4	36	5	31
68	0	55	1	51	2	47	3	43	4	38	5	34
69	0	56	1	52	2	48	3	44	4	40	5	36
70	0	56	1	53	2	49	3	46	4	42	5	38
71	0	56	1	54	2	50	3	47	4	43	5	40
72	0	57	1	54	2	51	3	48	4	45	5	42
73	0	57	1	55	2	52	3	49	4	46	5	44
74	0	57	1	55	2	53	3	51	4	48	5	46
75	0	58	1	56	2	54	3	52	4	49	5	47
76	0	58	1	56	2	55	3	53	4	51	5	49
77	0	58	1	57	2	56	3	54	4	52	5	50
78	0	58	1	57	2	56	3	55	4	53	5	52
79	0	59	1	58	2	57	3	56	4	54	5	53
80	0	59	1	58	2	57	3	56	4	55	5	54
81	0	59	1	59	2	58	3	57	4	56	5	55
82	0	59	1	59	2	58	3	58	4	57	5	56
83	0	59	1	59	2	59	3	58	4	58	5	57
84	1	0	1	59	2	59	3	59	4	58	5	58
85	1	0	1	59	2	59	3	59	4	59	5	58
86	1	0	2	0	3	0	3	59	4	59	5	59
87	1	0	2	0	3	0	4	0	4	59	5	59
88	1	0	2	0	3	0	4	0	5	0	6	0
89	1	0	2	0	3	0	4	0	5	0	6	0
90	1	0	2	0	3	0	4	0	5	0	6	0

The Table of *the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

°	7 ′	″	8 ′	″	9 ′	″	10 ′	″	11 ′	″
0	0	0	0	0	0	0	0	0	0	0
1	0	7	0	8	0	09	0	09	0	11
2	0	15	0	17	0	19	0	19	0	23
3	0	22	0	25	0	28	0	28	0	34
4	0	29	0	33	0	38	0	38	0	46
5	0	36	0	41	0	47	0	47	0	57
6	0	43	0	50	0	56	1	03	1	09
7	0	50	0	58	1	05	1	13	1	20
8	0	58	1	07	1	15	1	23	1	32
9	1	05	1	15	1	24	1	33	1	44
10	1	13	1	23	1	34	1	44	1	55
11	1	20	1	31	1	43	1	54	2	07
12	1	27	1	40	1	52	2	05	2	17
13	1	34	1	48	2	01	2	15	2	28
14	1	42	1	56	2	11	2	25	2	40
15	1	49	2	04	2	20	2	35	2	51
16	1	56	2	12	2	29	2	45	3	04
17	2	03	2	20	2	38	2	55	3	13
18	2	10	2	28	2	47	3	05	3	24
19	2	17	2	36	2	56	3	15	3	35
20	2	24	2	44	3	05	3	25	3	46
21	2	30	2	52	3	13	3	35	3	56
22	2	37	3	0	3	22	3	45	4	07
23	2	45	3	09	3	31	3	54	4	17
24	2	51	3	15	3	40	4	04	4	28
25	2	57	3	24	3	48	4	13	4	38
26	3	04	3	30	3	57	4	23	4	49
27	3	10	3	37	4	05	4	32	4	59
28	3	17	3	45	4	13	4	42	5	10
29	3	23	3	52	4	21	4	51	5	20
30	3	30	4	0	4	30	5	0	5	30

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

°	7 ′ ″	8 ′ ″	9 ′ ″	10 ″ ′	11 ′ ″
30	3 30	4 0	4 30	5 0	5 30
31	3 36	4 7	4 38	5 9	5 40
32	3 43	4 14	4 46	5 18	5 50
33	3 47	4 21	4 54	5 26	5 59
34	3 55	4 28	5 2	5 35	6 9
35	4 1	4 35	5 9	5 44	6 18
36	4 7	4 42	5 17	5 53	6 28
37	4 13	4 48	5 24	6 1	6 37
38	4 19	4 55	5 31	6 9	6 46
39	4 24	5 2	5 39	6 17	6 55
40	4 30	5 9	5 47	6 26	7 4
41	4 36	5 15	5 54	6 33	7 13
42	4 41	5 21	6 1	6 41	7 22
43	4 46	5 27	6 8	6 49	7 30
44	4 52	5 33	6 15	6 57	7 39
45	4 57	5 39	6 21	7 4	7 47
46	5 2	5 45	6 28	7 12	7 55
47	5 7	5 51	6 34	7 19	8 3
48	5 12	5 57	6 41	7 26	8 11
49	5 17	6 2	6 47	7 33	8 18
50	5 22	6 8	6 54	7 40	8 26
51	5 26	6 13	7 0	7 46	8 33
52	5 31	6 18	7 6	7 53	8 40
53	5 35	6 23	7 11	7 59	8 47
54	5 40	6 28	7 17	8 5	8 54
55	5 44	6 33	7 22	8 11	9 0
56	5 48	6 38	7 28	8 17	9 7
57	5 52	6 42	7 33	8 23	9 13
58	5 56	6 47	7 38	8 29	9 20
59	6 0	6 51	7 43	8 34	9 26
60	6 4	6 56	7 48	8 40	9 32

The Table of the Moon's Parallax in Longitude and Latitude, continued.

The Moon's Horizontal Parallax.

°	7 ′	7 ″	8 ′	8 ″	9 ′	9 ″	10 ′	10 ″	11 ′	11 ″
60	6	04	6	56	7	48	8	40	9	32
61	6	07	7	0	7	52	8	45	9	37
62	6	11	7	4	7	57	8	50	9	43
63	6	15	7	7	8	1	8	54	9	48
64	6	18	7	11	8	5	8	59	9	53
65	6	21	7	15	8	9	9	04	9	58
66	6	24	7	19	8	13	9	08	10	03
67	6	26	7	22	8	17	9	12	10	07
68	6	29	7	25	8	21	9	16	10	12
69	6	31	7	28	8	24	9	20	10	16
70	6	34	7	31	8	27	9	24	10	20
71	6	36	7	34	8	30	9	27	10	24
72	6	39	7	37	8	34	9	31	10	28
73	6	41	7	39	8	36	9	34	10	31
74	6	44	7	41	8	39	9	37	10	35
75	6	46	7	43	8	41	9	39	10	38
76	6	48	7	45	8	44	9	42	10	41
77	6	49	7	47	8	46	9	44	10	43
78	6	51	7	49	8	48	9	47	10	46
79	6	52	7	51	8	50	9	49	10	48
80	6	54	7	53	8	52	9	51	10	50
81	6	55	7	54	8	53	9	52	10	52
82	6	56	7	55	8	54	9	54	10	54
83	6	57	7	56	8	55	9	55	10	55
84	6	57	7	57	8	56	9	56	10	56
85	6	58	7	58	8	57	9	57	10	57
86	6	59	7	59	8	58	9	58	10	58
87	6	59	7	59	8	59	9	59	10	59
88	7	0	8	0	8	59	9	59	11	0
89	7	0	8	0	9	0	10	0	11	0
90	7	0	8	0	9	0	10	0	11	0

A Table of the Moon's Parallax in Longitude and Latitude, continued.

The Moon's Hosizontal Parallax.

°	12 '	12 "	13 '	13 "	14 '	14 "	15 '	15 "	16 '	16 "
0	0	0	0	0	0	0	0	0	0	0
1	0	12	0	13	0	14	0	15	0	16
2	0	25	0	27	0	31	0	31	0	33
3	0	37	0	40	0	47	0	47	0	50
4	0	50	0	54	0	03	1	03	1	07
5	1	02	1	07	1	18	1	18	1	23
6	1	15	1	21	1	28	1	34	1	40
7	1	27	1	35	1	42	1	49	1	57
8	1	40	1	49	1	57	2	05	2	14
9	1	52	2	02	2	11	2	20	2	30
10	2	05	2	15	2	29	2	36	2	47
11	2	17	2	28	2	40	2	51	3	03
12	2	30	2	42	2	55	3	07	3	19
13	2	32	2	55	3	09	3	22	3	35
14	2	54	3	09	3	23	3	38	3	52
15	3	06	3	22	3	37	3	53	4	08
16	3	18	3	35	3	51	4	08	4	25
17	3	30	3	48	4	05	4	23	4	41
18	3	42	4	01	4	19	4	38	4	57
19	3	54	4	14	4	33	4	53	5	12
20	4	06	4	27	4	47	5	08	5	28
21	4	18	4	39	5	01	5	22	5	43
22	4	30	4	52	5	15	5	37	5	59
23	4	41	5	04	5	28	5	51	6	14
24	4	53	5	17	5	42	6	06	6	30
25	5	04	5	30	5	55	6	20	6	45
26	5	16	5	42	6	08	6	34	7	01
27	5	28	5	54	6	21	6	48	7	16
28	5	38	6	06	6	34	7	02	7	31
29	5	49	6	18	6	47	7	17	7	45
30	6	00	6	30	7	0	7	30	8	0

A Table of the Moon's Parallax in Longitude and Latitude, continued.

The Moon's Horizontal Parallax.

°	12 ′	″	13 ′	″	14 ′	″	15 ′	″	16 ′	″
30	6	0	6	30	7	0	7	30	8	0
31	6	11	6	41	7	12	7	43	8	14
32	6	22	6	53	7	25	7	47	8	29
33	6	33	7	04	7	37	8	10	8	43
34	6	43	7	16	7	50	8	23	8	57
35	6	53	7	28	8	02	8	36	9	10
36	7	03	7	38	8	14	8	49	9	24
37	7	13	7	49	8	25	9	01	9	37
38	7	23	8	0	8	37	9	14	9	51
39	7	33	8	10	8	48	9	26	10	04
40	7	43	8	21	9	0	9	38	10	17
41	7	54	8	31	9	11	9	50	10	29
42	8	02	8	42	9	22	10	02	10	42
43	8	11	8	52	9	33	10	13	10	54
44	8	20	9	02	9	44	10	23	11	07
45	8	29	9	11	9	56	10	36	11	19
46	8	38	9	21	10	04	10	47	11	31
47	8	46	9	30	10	14	10	58	11	42
48	8	55	9	40	10	24	11	09	11	53
49	9	03	9	49	10	34	11	19	12	04
50	9	12	9	58	10	44	11	29	12	15
51	9	19	10	06	10	53	11	39	12	26
52	9	27	10	15	11	02	11	49	12	37
53	9	34	10	23	11	10	11	58	12	47
54	9	42	10	31	11	19	12	08	12	57
55	9	49	10	39	11	27	12	17	13	06
56	9	57	10	47	11	36	12	26	13	16
57	10	04	10	54	11	44	12	34	13	25
58	10	11	11	01	11	52	12	43	13	34
59	10	17	11	08	11	57	12	51	13	42
60	10	24	11	16	12	02	12	59	13	51

A Table *of the Moon's Parallax in Longitude and Latitude continued.*

The Moon's Horizontal Parallax.

°	12 ′	12 ″	13 ′	13 ″	14 ′	14 ″	15 ′	15 ″	16 ′	16 ″
60	10	24	11	16	12	2	12	59	13	51
61	10	30	11	22	12	12	13	7	13	59
62	10	36	11	29	12	22	13	15	14	8
63	10	42	11	34	12	28	13	22	14	15
64	10	47	11	41	12	35	13	29	14	23
65	10	53	11	49	12	41	13	35	14	30
66	10	58	11	53	12	47	13	42	14	37
67	11	3	11	58	12	53	13	48	14	43
68	11	8	12	3	12	59	13	54	14	50
69	11	12	12	8	13	4	14	0	14	56
70	11	17	12	13	13	9	14	6	15	2
71	11	21	12	17	13	14	14	11	15	7
72	11	25	12	22	13	19	14	16	15	13
73	11	28	12	26	13	23	14	20	15	18
74	11	32	12	30	13	28	14	25	15	23
75	11	35	12	33	13	32	14	29	15	27
76	11	39	12	37	13	36	14	33	15	32
77	11	41	12	40	13	39	14	36	15	35
78	11	44	12	43	13	42	14	40	15	39
79	11	46	12	45	13	44	14	43	15	42
80	11	49	12	48	13	47	14	46	15	45
81	11	51	12	50	13	50	14	48	15	48
82	11	53	12	52	13	52	14	51	15	51
83	11	54	12	54	13	53	14	53	15	53
84	11	55	12	55	13	55	14	55	15	55
85	11	56	12	56	13	56	14	57	15	57
86	11	58	12	58	13	58	14	58	15	58
87	11	59	12	59	13	59	14	59	15	59
88	12	0	13	0	14	0	14	59	15	59
89	12	0	13	0	14	0	15	0	16	0
90	12	0	13	0	14	0	15	0	16	0

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

°	17 ′	17 ″	18 ′	18 ″	19 ′	19 ″	20 ′	20 ″	21 ′	21 ″
0	0	0	0	0	0	0	0	0	0	0
1	0	17	0	18	0	19	0	21	0	22
2	0	35	0	37	0	40	0	42	0	44
3	0	53	0	56	0	59	1	03	1	06
4	1	11	1	15	1	19	1	24	1	28
5	1	29	1	34	1	39	1	45	1	50
6	1	47	1	53	1	59	2	05	2	12
7	2	04	2	11	2	19	2	26	2	33
8	2	22	2	30	2	39	2	47	2	55
9	2	39	2	48	2	58	3	08	3	17
10	2	57	3	07	3	18	3	28	3	39
11	3	14	3	25	3	37	3	49	4	0
12	3	32	3	44	3	57	4	09	4	22
13	3	49	4	02	4	16	4	29	4	44
14	4	07	4	21	4	36	4	50	5	05
15	4	24	4	39	4	55	5	11	5	26
16	4	41	4	58	5	14	5	31	5	47
17	4	58	5	16	5	33	5	52	6	08
18	5	15	5	34	5	52	6	11	6	29
19	5	32	5	51	6	11	6	30	6	50
20	5	49	6	09	6	30	6	50	7	11
21	6	05	6	26	6	48	7	09	7	31
22	6	22	6	44	7	07	7	29	7	52
23	6	38	7	01	7	25	7	48	8	13
24	6	55	7	19	7	44	8	08	8	32
25	7	11	7	36	8	02	8	27	8	52
26	7	27	7	53	8	20	8	46	9	12
27	7	42	8	10	8	37	9	04	9	31
28	7	57	8	27	8	55	9	23	9	51
29	8	13	8	43	9	12	9	41	10	10
30	8	30	9	0	9	30	10	0	10	30

The

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

°	17 ′	17 ″	18 ′	18 ″	19 ′	19 ″	20 ′	20 ″	21 ′	21 ″
30	8	30	9	0	9	30	10	0	10	30
31	8	45	9	16	9	45	10	18	10	49
32	9	01	9	33	10	05	10	37	11	08
33	9	15	9	48	10	21	10	54	11	26
34	9	30	10	04	10	37	11	11	11	44
35	9	45	10	19	10	52	11	28	12	02
36	10	0	10	35	11	10	11	45	12	21
37	10	14	10	50	11	26	12	02	12	38
38	10	28	11	05	11	42	12	19	12	56
39	10	42	11	19	11	57	12	35	13	13
40	10	56	11	34	12	13	12	51	13	30
41	11	09	11	48	12	28	13	07	13	46
42	11	23	12	03	12	43	13	23	14	03
43	11	36	12	16	12	57	13	39	14	19
44	11	49	12	30	13	02	13	54	14	35
45	12	01	12	43	13	26	14	08	14	50
46	12	14	12	57	13	40	14	23	15	06
47	12	26	13	09	13	53	14	37	15	21
48	12	38	13	22	14	07	14	52	15	36
49	12	49	13	34	14	20	15	04	15	50
50	13	01	13	47	14	33	15	19	16	05
51	13	12	13	59	14	45	15	32	16	19
52	13	24	14	11	14	58	15	46	16	33
53	13	35	14	22	15	10	15	58	16	46
54	13	45	14	34	15	22	16	11	16	59
55	13	55	14	44	15	33	16	23	17	11
56	14	05	14	55	15	45	16	35	17	24
57	14	15	15	05	15	56	16	46	17	36
58	14	25	15	16	16	07	16	58	17	49
59	14	34	15	25	16	17	17	08	18	0
60	14	43	15	35	16	27	17	19	18	11

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

°	17 ′	17 ″	18 ′	18 ″	19 ′	19 ″	20 ′	20 ″	21 ′	21 ″
60	14	43	15	35	16	27	17	19	18	11
61	14	52	15	44	16	32	17	29	18	22
62	15	01	15	54	16	47	17	40	18	33
63	15	09	16	2	16	56	17	50	18	43
64	15	17	16	11	17	5	17	59	18	53
65	15	24	16	19	17	13	18	8	19	2
66	15	32	16	27	17	22	18	16	19	11
67	15	39	16	34	17	29	18	25	19	20
68	15	46	16	41	17	37	18	33	19	28
69	15	52	16	48	17	44	18	40	19	36
70	15	59	16	55	17	51	18	48	19	44
71	16	05	17	1	17	57	18	55	19	51
72	16	10	17	7	18	4	19	1	19	58
73	16	15	17	12	18	10	19	8	20	5
74	16	21	17	18	18	16	19	14	20	1
75	16	25	17	23	18	21	19	20	20	17
76	16	30	17	29	18	26	19	25	20	23
77	16	34	17	33	18	30	19	30	20	28
78	16	38	17	37	18	35	19	34	20	32
79	16	41	17	40	18	39	19	38	20	37
80	16	44	17	43	18	43	19	42	20	41
81	16	47	17	46	18	46	19	4[illegible]	20	45
82	16	50	17	49	18	49	19	48	20	48
83	16	52	17	52	18	52	19	51	20	51
84	16	54	17	54	18	55	19	53	20	53
85	16	56	17	56	18	56	19	55	20	55
86	16	57	17	57	18	57	19	57	20	57
87	16	58	17	58	18	58	19	58	20	58
88	16	59	17	59	18	59	19	59	20	59
89	17	0	18	0	19	0	20	0	21	0
90	17	0	18	0	19	0	20	0	21	0

A Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

°	22 '	22 "	23 '	23 "	24 '	24 "	25 '	25 "	26 '	26 "
0	0	0	0	0	0	0	0	0	0	0
1	0	23	0	24	0	25	0	26	0	27
2	0	46	0	48	0	50	0	52	0	54
3	1	09	1	12	1	15	1	19	1	22
4	1	32	1	36	1	40	1	45	1	49
5	1	55	2	0	2	5	2	11	2	16
6	2	18	2	24	2	30	2	37	2	43
7	2	41	2	48	2	55	3	03	3	10
8	3	04	3	12	3	20	3	29	3	37
9	3	27	3	36	3	45	3	55	4	04
10	3	49	4	0	4	10	4	20	4	31
11	4	12	4	24	4	35	4	46	4	58
12	4	34	4	47	4	59	5	12	5	24
13	4	57	5	11	5	24	5	38	5	51
14	5	19	5	34	5	48	6	03	6	17
15	5	42	5	57	6	13	6	28	6	44
16	6	04	6	20	6	37	6	53	7	10
17	6	26	6	43	7	1	7	18	7	36
18	6	48	7	6	7	25	7	43	8	02
19	7	10	7	29	7	49	8	08	8	28
20	7	31	7	52	8	12	8	33	8	53
21	7	53	8	15	8	36	8	58	9	19
22	8	14	8	37	8	59	9	22	9	44
23	8	36	8	59	9	23	9	46	10	09
24	8	57	9	21	9	46	10	10	10	34
25	9	18	9	43	10	9	10	34	10	59
26	9	39	10	5	10	31	10	57	11	24
27	10	0	10	27	10	54	11	21	11	48
28	10	20	10	48	11	16	11	44	12	12
29	10	40	11	10	11	38	12	07	12	36
30	11	0	11	30	12	0	12	30	13	0

The Table of the Moon's Parallax in Longitude and Latitude, continued.

The Moon's Horizonsal Parallax.

°	22 '	22 "	23 '	23 "	24 '	24 "	25 '	25 "	26 '	26 "
30	11	0	11	30	12	0	12	30	13	00
31	11	20	11	51	12	22	12	53	13	24
32	11	40	12	12	12	44	13	16	13	48
33	11	59	12	42	13	06	13	38	14	10
34	12	18	12	52	13	25	13	59	14	32
35	12	37	13	12	13	46	14	21	14	54
36	12	56	13	31	14	06	14	42	15	17
37	13	15	13	50	14	26	15	04	15	39
38	13	33	14	09	14	46	15	23	16	0
39	13	51	14	28	15	06	15	44	16	22
40	14	08	14	47	15	26	16	04	16	43
41	14	26	15	05	15	45	16	24	17	05
42	14	43	15	23	16	04	16	44	17	24
43	15	0	15	41	16	22	17	03	17	44
44	15	17	15	59	16	40	17	22	18	04
45	15	34	16	16	16	58	17	41	18	23
46	15	50	16	33	17	16	17	59	18	42
47	16	06	16	49	17	33	18	17	19	01
48	16	21	17	05	17	50	18	35	19	19
49	16	36	17	21	18	07	18	52	19	37
50	16	51	17	37	18	23	19	09	19	55
51	17	06	17	53	18	39	19	26	20	12
52	17	20	18	08	18	55	19	42	20	29
53	17	34	18	22	19	10	19	58	20	46
54	17	48	18	36	19	25	20	13	21	02
55	18	01	18	50	19	40	20	28	21	18
56	18	14	19	04	19	54	20	43	21	33
57	18	27	19	17	20	08	21	08	21	48
58	18	39	19	30	20	21	21	12	22	03
59	18	51	19	43	20	34	21	26	22	17
60	19	03	19	55	20	47	21	39	22	31

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

°	22 ′	″	23 ′	″	24 ′	″	25 ′	″	26 ′	″
60	19	03	19	55	20	47	21	39	22	31
61	19	15	20	07	21	0	21	52	22	45
62	19	26	20	19	21	12	22	5	22	58
63	19	37	20	30	21	23	22	17	23	10
64	19	47	20	40	21	34	22	28	23	22
65	19	57	20	51	21	45	22	39	23	34
66	20	06	21	01	21	56	22	50	23	45
67	20	15	21	11	22	06	23	1	23	57
68	20	24	21	20	22	15	23	11	24	6
69	20	32	21	29	22	24	23	21	24	16
70	20	40	21	37	22	33	23	30	24	26
71	20	48	21	45	22	42	23	39	24	35
72	20	55	21	53	22	50	23	47	24	44
73	21	02	22	0	22	57	23	55	24	52
74	21	09	22	07	23	04	24	2	25	0
75	21	15	22	13	23	11	24	9	25	7
76	21	21	22	19	23	18	24	16	25	14
77	21	26	22	25	23	23	24	22	25	20
78	21	31	22	30	23	28	24	27	25	26
79	21	36	22	35	23	33	24	32	25	31
80	21	40	22	39	23	38	24	37	25	36
81	21	44	22	43	23	42	24	41	25	41
82	21	47	22	47	23	46	24	4[illegible]	25	45
83	21	50	22	50	23	49	24	49	25	48
84	21	53	22	52	23	52	24	52	25	51
85	21	55	22	55	23	54	24	54	25	54
86	21	57	22	57	23	56	24	56	25	56
87	21	58	22	58	23	58	24	58	25	58
88	21	59	22	59	23	59	24	59	25	59
89	21	59	22	59	24	0	25	0	26	0
90	22	0	23	0	24	0	25	0	26	0

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

°	27 ′	27 ″	28 ′	28 ″	29 ′	29 ″	30 ′	30 ″	31 ′	31 ″
0	0	0	0	0	0	0	0	0	0	0
1	0	28	0	29	0	30	0	32	0	33
2	0	56	0	58	1	0	1	03	1	05
3	1	25	1	28	1	31	1	35	1	38
4	1	52	1	57	2	01	2	06	2	10
5	2	21	2	26	2	32	2	37	2	42
6	2	49	2	55	3	02	3	08	3	14
7	3	18	3	25	3	32	3	39	3	47
8	3	45	3	54	4	02	4	11	4	19
9	4	13	4	23	4	32	4	42	4	51
10	4	41	4	52	5	02	5	13	5	23
11	5	09	5	20	5	32	5	44	5	55
12	5	37	5	49	6	02	6	14	6	26
13	6	05	6	18	6	32	6	45	6	58
14	6	32	6	46	7	01	7	16	7	30
15	6	59	7	15	7	30	7	46	8	02
16	7	26	7	43	7	59	8	16	8	33
17	7	53	8	11	8	28	8	45	9	04
18	8	20	8	39	8	57	9	16	9	35
19	8	47	9	07	9	26	9	46	10	06
20	9	14	9	34	9	55	10	16	10	36
21	9	41	10	02	10	24	10	45	11	06
22	10	07	10	29	10	52	11	14	11	36
23	10	33	10	56	11	20	11	43	12	06
24	10	59	11	23	11	48	12	12	12	36
25	11	25	11	51	12	16	12	41	13	06
26	11	50	12	16	12	43	13	09	13	35
27	12	15	12	43	13	10	13	37	14	04
28	12	40	13	09	13	37	14	05	14	33
29	13	05	13	35	14	04	14	33	15	02
30	13	30	14	0	14	30	15	0	15	30

The Table of the Moon's Parallax in Longitude and Latitude continued.

The Moon's Horizontal Parallax.

°	27 ′	″	28 ′	″	29 ′	″	30 ′	″	31 ′	″
30	13	30	14	0	14	30	15	0	15	30
31	13	55	14	26	14	57	15	27	15	58
32	14	19	14	51	15	23	15	54	16	26
33	14	42	15	15	15	48	16	21	16	53
34	15	5	15	39	16	12	16	47	17	20
35	15	29	15	53	16	38	17	13	17	47
36	15	52	16	27	17	3	17	38	18	13
37	16	15	16	51	17	27	18	3	18	39
38	16	37	17	14	17	51	18	28	19	5
39	16	59	17	37	18	15	18	53	19	31
40	17	21	18	0	18	38	19	17	19	56
41	17	43	18	22	19	1	19	41	20	21
42	18	4	18	44	19	24	20	5	20	45
43	18	26	19	6	19	47	20	28	21	9
44	18	45	19	27	20	9	20	51	21	32
45	19	5	19	48	20	31	21	13	21	55
46	19	25	20	9	20	52	21	35	22	18
47	19	45	20	29	21	14	21	57	22	40
48	20	4	20	48	21	33	22	18	23	2
49	20	23	21	8	21	53	22	40	23	24
50	20	41	21	27	22	13	22	59	23	45
51	20	59	21	46	22	32	23	19	24	7
52	21	17	22	4	22	51	23	39	24	26
53	21	34	22	22	23	9	23	58	24	46
54	21	50	22	39	23	27	24	16	25	5
55	22	7	22	56	23	45	24	34	25	24
56	22	23	23	13	24	2	24	52	25	42
57	22	39	23	29	24	19	25	10	26	0
58	22	54	23	45	24	36	25	27	26	17
59	23	9	24	0	24	52	25	43	26	34
60	23	23	24	15	25	7	25	59	26	51

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

°	27 ′	″	28 ′	″	29 ′	″	30 ′	″	31 ′	″
60	23	23	24	15	25	7	25	59	26	51
61	23	37	24	30	25	22	26	15	27	7
62	23	51	24	44	25	37	26	30	27	22
63	24	04	24	57	25	51	26	44	27	37
64	24	16	25	10	26	4	26	58	27	52
65	24	28	25	23	26	20	27	12	28	8
66	24	40	25	35	26	30	27	25	28	23
67	24	51	25	47	26	42	27	37	28	34
68	25	02	25	58	26	53	27	49	28	45
69	25	12	26	9	27	4	28	1	28	57
70	25	22	26	19	27	15	28	12	29	8
71	25	32	26	29	27	25	28	20	29	19
72	25	41	26	38	27	35	28	32	29	29
73	25	49	26	47	27	44	28	42	29	39
74	25	57	26	55	27	53	28	51	29	48
75	26	05	27	3	28	1	28	59	29	57
76	26	12	27	11	28	9	29	7	30	5
77	26	18	27	17	28	16	29	14	30	12
78	26	24	27	23	28	22	29	21	30	19
79	26	30	27	29	28	28	29	27	30	26
80	26	35	27	34	28	33	29	33	30	32
81	26	40	27	39	28	38	29	38	30	37
82	26	44	27	44	28	43	29	43	30	42
83	26	48	27	48	28	47	29	47	30	46
84	26	51	27	51	28	50	29	50	30	50
85	26	54	27	54	28	53	29	53	30	53
86	26	56	27	56	28	56	29	56	30	55
87	26	58	27	58	28	58	29	58	30	57
88	26	59	27	59	28	59	29	59	30	59
89	27	0	28	0	29	0	30	0	31	0
90	27	0	28	0	29	0	30	0	31	0

A Table of the Moon's Parallax in Longitude and Latitude, continued.

The Moon's Hosizontal Parallax.

°	32 '	"	33 '	"	34 '	"	35 '	"	36 '	"
0	0	0	0	0	0	0	0	0	0	0
1	0	33	0	35	0	36	0	37	0	38
2	1	6	1	9	1	11	1	13	1	15
3	1	40	1	44	1	47	1	50	1	53
4	2	14	2	18	2	22	2	26	2	31
5	2	47	2	53	2	58	3	3	3	9
6	3	20	3	27	3	33	3	39	3	46
7	3	54	4	2	4	9	4	16	4	14
8	4	27	4	36	4	44	4	52	5	1
9	5	0	5	10	5	19	5	29	5	38
10	5	33	5	44	5	54	6	5	6	15
11	6	6	6	18	6	29	6	41	6	52
12	6	39	6	51	7	4	7	16	7	29
13	7	12	7	25	7	39	7	52	8	6
14	7	44	7	59	8	14	8	28	8	43
15	8	17	8	33	8	48	9	4	8	19
16	8	49	9	6	9	22	9	39	9	55
17	9	21	9	39	9	56	10	14	10	31
18	9	53	10	12	10	30	10	49	11	7
19	10	26	10	45	11	4	11	24	11	43
20	10	56	11	17	11	38	11	58	12	19
21	11	28	11	49	12	11	12	32	12	54
22	11	59	12	21	12	44	13	6	13	29
23	12	30	12	53	13	17	13	40	14	4
24	13	1	13	25	13	50	14	14	14	38
25	13	31	13	57	14	22	14	47	15	13
26	14	1	14	28	14	54	15	20	15	47
27	14	31	15	0	15	26	15	53	16	21
28	15	1	15	29	13	58	16	26	16	54
29	15	31	15	59	16	29	16	58	17	27
30	16	0	16	30	17	0	17	30	18	0

A Table of the Moon's Parallax in Longitude and Latitude continued.

The Moon's Horizontal Parallax.

°	32 ′	″	33 ′	″	34 ′	′	35 ′	″	36 ′	″
30	16	25	16	30	17	0	17	30	18	0
31	16	29	17	0	17	31	18	2	18	33
32	16	57	17	29	18	1	18	33	19	5
33	17	25	17	58	18	31	19	3	19	38
34	17	53	18	27	19	1	19	33	20	8
35	18	21	18	56	19	30	20	5	20	39
36	18	48	19	24	19	59	20	34	21	10
37	19	16	19	52	20	28	21	4	21	40
38	19	43	20	19	20	56	21	33	22	13
39	20	9	20	46	21	24	22	2	22	39
40	20	34	21	13	21	51	22	30	23	6
41	21	0	21	39	22	18	22	58	23	37
42	21	25	22	5	22	45	23	25	24	5
43	21	50	22	31	23	11	23	52	24	33
44	22	14	22	56	23	37	24	19	25	1
45	22	38	23	20	24	3	24	45	25	28
46	23	1	33	44	24	28	25	11	25	54
47	23	25	24	8	24	52	25	36	26	20
48	23	46	24	31	25	16	26	0	26	45
49	24	9	24	54	25	40	26	25	27	10
50	24	31	25	17	26	3	26	49	27	35
51	24	52	25	39	26	26	27	12	27	59
52	25	13	26	0	26	48	27	35	28	22
53	25	33	26	21	27	9	27	57	28	45
54	25	53	26	42	27	30	28	19	29	7
55	26	12	27	2	27	51	28	40	29	29
56	26	31	27	21	28	11	29	1	29	50
57	26	50	27	40	28	31	29	21	30	11
58	27	08	27	59	28	50	29	41	30	32
59	27	26	28	17	29	9	30	0	30	52
60	27	43	28	35	29	27	30	19	31	11

A Table *of the Moon's Parallax in Longitude and Latitude continued.*

The Moon's Horizontal Parallax.

°	32 ′	″	33 ′	″	34 ′	″	35 ′	″	36 ′	″
60	27	43	28	35	29	27	30	19	31	11
61	27	59	28	52	29	44	30	37	31	29
62	28	15	29	8	30	1	30	54	31	47
63	28	31	29	24	30	18	31	11	32	5
64	28	46	29	40	30	34	31	28	32	22
65	29	0	29	55	30	49	31	44	32	38
66	29	14	30	9	31	4	31	59	32	53
67	29	27	30	23	31	18	32	13	33	8
68	29	40	30	36	31	32	22	27	33	23
69	29	52	30	49	31	45	32	40	33	37
70	30	4	31	1	31	57	32	53	33	50
71	30	15	31	15	32	9	33	5	34	2
72	30	26	31	23	32	20	33	17	34	14
73	30	36	31	34	32	31	33	28	34	26
74	30	49	31	44	32	41	33	39	34	37
75	30	55	31	53	32	51	33	49	34	47
76	31	3	32	2	33	0	33	58	34	56
77	31	11	32	10	33	8	34	6	35	5
78	31	18	32	17	33	15	34	14	35	13
79	31	24	32	24	33	22	34	21	35	20
80	31	30	32	30	33	29	34	28	35	27
81	31	36	32	36	33	35	34	34	35	33
82	31	41	32	41	33	40	34	40	35	39
83	31	45	32	45	33	45	34	44	35	44
84	31	49	32	49	33	49	34	48	35	48
85	31	52	32	52	33	52	34	52	35	52
86	31	55	32	55	33	55	34	55	35	55
87	31	57	32	57	33	57	34	57	35	57
88	31	59	32	59	33	59	34	59	35	59
89	32	0	33	0	34	0	35	0	36	0
90	32	0	33	0	34	0	35	0	36	0

The

The Table of the Moon's Parallax in Longitude and Latitude, continued.

The Moon's Horizontal Parallax.

°	37 ′	37 ″	38 ′	38 ″	39 ′	39 ″	40 ′	40 ″	41 ′	41 ″
0	0	0	0	0	0	0	0	0	0	0
1	0	39	0	40	0	41	0	42	0	43
2	1	17	1	19	1	21	1	23	1	25
3	1	56	1	59	2	2	2	5	2	9
4	2	39	2	39	2	43	2	47	2	52
5	3	14	3	19	3	24	3	29	3	35
6	3	52	3	58	4	4	4	11	4	17
7	4	31	4	28	4	45	5	53	5	0
8	5	9	5	17	5	26	5	34	5	42
9	5	47	5	57	8	6	6	16	6	25
10	6	25	6	36	6	46	6	57	7	7
11	7	3	7	15	7	26	7	38	7	49
12	7	41	7	54	8	6	8	19	8	31
13	8	19	8	33	8	46	9	0	9	13
14	8	57	9	12	9	26	9	41	9	55
15	9	35	9	50	10	6	10	21	10	37
16	10	12	10	28	10	45	11	1	11	18
17	10	49	11	6	11	24	11	41	11	59
18	11	26	11	44	12	3	12	21	12	40
19	12	3	12	12	12	42	13	1	13	21
20	12	39	13	0	13	20	13	41	14	1
21	13	15	13	37	13	58	14	20	14	40
22	13	51	14	14	14	36	14	59	15	19
23	14	27	14	51	15	14	15	38	16	58
24	15	3	15	27	15	52	16	16	16	40
25	15	38	16	3	16	29	16	54	17	19
26	16	13	16	39	17	6	17	32	17	58
27	16	48	17	15	17	42	18	10	18	37
28	17	22	17	50	18	18	18	47	19	15
29	17	56	18	25	18	54	19	24	19	54
30	18	30	19	0	19	30	20	0	20	30

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

°	37 ′	″	38 ′	″	39 ′	″	40 ′	″	41 ′	″
30	18	30	19	0	19	30	20	0	20	30
31	19	4	19	34	20	5	20	36	20	37
32	19	37	20	8	20	40	21	12	21	44
33	20	9	20	42	21	14	21	47	22	20
34	20	41	21	15	21	48	22	22	22	56
35	21	13	21	48	22	11	22	57	23	31
36	21	45	22	20	22	55	23	31	24	6
37	22	16	22	52	23	28	24	4	24	40
38	22	47	23	23	24	0	24	37	25	14
39	23	17	23	55	24	32	25	10	25	48
40	23	47	24	26	25	4	25	43	26	21
41	24	17	24	56	25	35	26	5	26	54
42	24	46	25	26	26	6	26	49	27	26
43	25	14	25	55	26	36	27	18	27	58
44	25	42	26	24	27	6	27	47	28	29
45	26	10	26	52	27	35	28	17	29	1
46	26	37	27	20	28	3	28	47	29	30
47	27	4	27	47	28	31	29	15	29	59
48	27	30	28	14	28	59	29	43	30	28
49	27	56	28	41	26	26	30	11	30	57
50	28	21	29	7	29	53	30	39	31	25
51	28	45	29	32	30	19	31	5	31	52
52	29	9	29	57	30	44	31	31	32	19
53	29	33	30	21	31	9	31	56	32	45
54	29	56	30	44	31	33	32	21	33	10
55	30	18	31	7	31	57	32	45	33	35
56	30	40	31	30	32	20	33	9	33	59
57	31	2	31	52	32	42	33	32	34	23
58	31	23	32	14	33	4	33	55	34	46
59	31	43	32	35	33	26	34	17	35	9
60	32	3	32	55	33	47	34	39	33	31

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

°	37 ′	″	38 ′	″	39 ′	″	40 ′	″	41 ′	″
60	32	3	32	55	33	47	34	39	35	31
61	32	22	33	14	34	7	34	59	35	52
62	32	40	33	33	34	26	35	19	36	12
63	32	58	33	51	34	45	35	38	36	32
64	33	16	34	9	35	3	35	57	36	51
65	33	32	34	26	35	21	36	15	37	9
66	33	48	34	43	35	38	36	33	37	27
67	34	3	34	59	35	54	36	49	37	44
68	34	18	35	14	36	10	37	5	38	1
69	34	32	35	29	36	25	37	20	38	17
70	34	46	35	43	36	39	37	35	38	32
71	34	59	35	56	36	53	37	49	38	46
72	35	11	36	9	37	6	38	3	39	0
73	35	23	36	21	37	11	38	15	39	13
74	35	34	36	32	37	30	38	27	39	25
75	35	45	36	44	37	41	38	38	39	37
76	35	55	36	53	37	51	38	49	39	48
77	36	3	37	2	38	0	38	58	39	57
78	36	11	37	10	38	9	39	7	40	6
79	36	19	37	18	38	17	39	15	40	14
80	36	26	37	25	38	24	39	23	40	22
81	36	32	37	32	38	31	39	30	40	29
82	36	38	37	38	38	37	39	37	40	36
83	36	43	37	43	38	42	39	42	40	41
84	36	48	37	47	38	47	39	47	40	46
85	36	51	37	51	38	51	39	51	40	50
86	36	54	37	54	38	54	39	54	40	54
87	36	57	37	57	38	57	39	57	40	57
88	36	59	37	59	38	59	39	59	40	59
89	37	0	38	0	39	0	40	0	41	0
90	37	0	38	0	39	0	40	0	41	0

A Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

°	42 ′	″	43 ′	″	44 ′	″	45 ′	″	46 ′	″
0	0	0	0	0	0	0	0	0	0	0
1	0	44	0	45	0	46	0	47	0	48
2	1	27	1	30	1	32	1	34	1	36
3	2	12	2	15	2	18	2	21	2	24
4	2	56	3	0	3	4	3	8	3	12
5	3	40	3	45	3	50	3	55	4	0
6	4	23	4	29	4	36	4	41	4	48
7	5	7	5	14	5	22	5	29	5	36
8	5	51	5	59	6	7	6	16	6	24
9	6	4	6	44	6	53	7	3	7	12
10	7	17	7	28	7	38	7	49	7	59
11	8	1	8	12	8	24	8	35	8	46
12	8	44	8	56	9	9	9	21	9	33
13	9	27	9	40	9	54	10	7	10	21
14	10	10	10	24	10	39	10	53	11	8
15	10	52	11	8	11	23	11	39	11	55
16	11	34	11	51	12	2	12	24	12	41
17	12	16	12	34	12	51	13	9	13	27
18	12	58	13	17	13	35	13	54	14	13
19	13	40	14	0	14	19	14	39	14	59
20	14	22	14	42	15	3	15	23	15	44
21	15	4	15	24	15	46	16	7	16	29
22	15	44	16	6	16	29	16	51	17	13
23	16	25	16	48	17	12	17	35	17	58
24	17	5	17	29	17	54	18	18	18	42
25	17	45	18	10	18	36	19	1	19	26
26	11	25	18	51	19	17	19	43	20	10
27	19	4	19	31	19	58	20	25	20	53
28	19	43	20	11	20	39	21	7	21	36
29	20	22	20	51	21	20	21	49	22	18
30	21	0	21	30	22	0	22	30	23	0

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

°	42 ′	″	43 ′	″	44 ′	″	45 ′	″	46 ′	″
30	21	0	21	30	22	0	22	30	23	0
31	21	38	22	09	22	40	23	11	23	42
32	22	16	22	47	23	19	23	51	24	23
33	23	53	23	14	23	58	24	31	25	3
34	23	29	24	3	24	36	25	10	25	43
35	24	5	24	40	25	14	25	49	26	23
36	24	41	25	16	25	52	26	27	27	2
37	25	16	25	52	26	29	27	5	27	41
38	25	51	26	28	27	5	27	42	28	19
39	26	26	27	3	27	41	28	19	28	57
40	27	00	27	38	28	17	28	55	29	34
41	27	33	28	12	28	52	29	31	30	11
42	28	06	28	46	29	27	30	7	30	47
43	28	39	29	19	30	1	30	42	31	12
44	29	11	29	52	30	34	31	16	31	57
45	29	42	30	24	31	7	31	49	32	32
46	30	13	30	56	31	39	32	22	33	6
47	30	43	31	28	32	11	32	54	33	39
48	31	12	31	57	32	42	33	26	34	11
49	31	42	32	27	33	13	33	57	34	43
50	32	11	32	57	33	43	34	28	35	14
51	32	40	33	25	34	12	34	58	35	46
52	33	8	33	53	34	40	35	28	36	15
53	33	33	34	20	35	8	35	56	36	44
54	33	58	34	47	35	35	36	24	37	13
55	34	24	35	13	36	2	36	51	37	41
56	34	49	35	39	36	28	37	18	38	8
57	35	13	36	4	36	54	37	44	38	35
58	35	37	36	28	37	19	38	10	39	1
59	36	0	36	52	37	43	38	34	39	26
60	36	23	37	15	38	7	38	58	39	50

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

°	42 ′	″	43 ′	″	44 ′	″	45 ′	″	46 ′	″
60	36	23	37	15	38	7	38	58	32	50
61	36	44	37	37	38	29	39	21	40	14
62	37	5	37	58	38	51	39	44	40	37
63	37	25	38	20	39	12	40	6	40	59
64	37	45	38	39	39	33	40	27	41	21
65	38	4	38	58	39	53	40	47	41	43
66	38	22	39	17	40	12	41	7	42	2
67	38	40	39	35	40	30	41	25	42	21
68	38	57	39	52	40	48	41	43	42	39
69	39	13	40	8	41	5	42	0	42	57
70	39	28	40	24	41	21	42	17	43	14
71	39	43	40	39	41	36	42	33	43	30
72	39	57	40	54	41	51	42	48	43	45
73	40	10	41	7	42	5	43	2	43	59
74	40	23	41	20	42	18	43	16	44	13
75	40	35	41	32	42	30	43	28	44	26
76	40	46	41	44	42	42	43	40	44	39
77	40	56	41	54	42	53	43	51	44	49
78	41	5	42	3	43	2	44	1	44	59
79	41	13	42	12	43	11	44	10	45	9
80	41	21	42	21	43	20	44	19	45	18
81	41	28	42	28	43	27	44	27	45	26
82	41	35	42	35	43	34	44	34	45	33
83	41	41	42	41	43	40	44	40	45	39
84	41	46	42	46	43	45	44	45	45	45
85	41	50	42	50	43	49	44	49	45	49
86	41	54	42	54	43	53	44	53	45	53
87	41	57	42	57	43	56	44	56	45	56
88	41	59	42	59	43	59	44	59	45	58
89	42	0	43	0	44	0	45	0	45	59
90	42	0	43	0	44	0	45	0	46	0

The

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

°	47 ′	47 ″	48 ′	48 ″	49 ′	49 ″	50 ′	50 ″	51 ′	51 ″
0	0	0	0	0	0	0	0	0	0	0
1	0	49	0	50	0	51	0	52	0	53
2	1	38	1	40	1	42	1	44	1	45
3	2	28	2	31	2	34	2	37	2	40
4	3	17	3	21	3	25	3	29	3	33
5	4	6	4	11	4	16	4	21	4	27
6	4	55	5	1	5	7	5	13	5	20
7	5	43	5	51	5	58	6	5	6	13
8	6	32	6	41	6	49	6	57	7	6
9	7	21	7	31	7	40	7	49	7	59
10	8	10	8	20	8	30	8	41	8	51
11	8	58	9	9	9	22	9	32	9	44
12	9	46	9	58	10	11	10	23	10	26
13	10	34	10	48	11	1	11	15	11	28
14	11	22	11	37	11	51	12	6	12	20
15	12	10	12	25	12	41	12	57	13	12
16	12	57	13	14	13	30	13	47	14	3
17	13	44	14	2	14	19	14	37	14	54
18	14	31	14	50	15	8	15	27	15	45
19	15	18	15	38	15	57	16	17	16	37
20	16	4	16	25	16	45	17	6	17	26
21	16	50	17	12	17	33	17	55	18	16
22	17	36	17	58	18	21	18	43	19	6
23	18	22	18	45	19	9	19	32	19	55
24	19	7	19	31	19	56	20	20	20	44
25	19	52	20	17	20	43	21	8	21	33
26	20	36	21	2	21	29	21	55	22	21
27	21	20	21	47	22	15	22	42	23	9
28	22	4	22	32	23	0	23	28	23	56
29	22	47	23	16	23	45	24	14	24	43
30	23	30	24	0	24	30	25	0	25	30

The Table *of the Moon's Parallax in Longitude and Latitude continued.*

The Moon's Horizontal Parallax.

°	47 ′	″	48 ′	″	49 ′	″	50 ′	″	51 ′	″
30	23	30	24	0	24	30	25	0	25	30
31	24	13	24	43	25	14	25	45	26	16
32	24	55	25	26	25	58	26	30	27	2
33	25	36	26	18	26	41	27	14	27	47
34	26	17	26	50	27	24	27	57	28	31
35	26	58	27	32	28	6	28	40	29	15
36	27	38	28	13	28	48	29	23	29	59
37	28	17	28	53	29	29	30	5	30	42
38	28	56	29	31	30	10	30	47	31	24
39	29	35	30	10	30	50	31	28	32	6
40	30	13	30	51	31	30	32	8	32	47
41	30	50	31	29	32	9	32	48	33	28
42	31	27	32	7	32	47	33	27	34	8
43	32	3	32	44	33	25	34	6	34	47
44	32	39	33	21	34	2	34	44	35	26
45	33	14	33	53	34	39	35	21	36	4
46	33	49	34	32	35	15	35	58	36	41
47	34	22	35	6	35	50	36	34	37	18
48	34	55	35	40	36	25	37	9	37	54
49	35	28	36	13	36	59	37	44	38	29
50	36	0	36	46	37	32	38	18	39	4
51	36	31	37	18	38	5	38	51	39	38
52	37	2	37	50	38	37	39	24	40	11
53	37	32	38	20	39	8	39	56	40	43
54	38	1	38	0	39	38	40	27	41	15
55	38	29	39	19	40	8	40	57	41	47
56	38	57	39	47	40	37	41	27	42	16
57	39	25	40	15	41	5	41	56	42	46
58	39	52	40	42	41	33	42	24	43	15
59	40	17	41	8	42	0	42	51	43	43
60	40	42	41	34	42	26	43	18	44	10

The

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

	47		48		49		50		51	
°	′	″	′	″	′	″	′	″	′	″
60	40	42	41	34	42	26	43	18	44	10
61	41	6	41	59	42	51	43	44	44	36
62	41	30	42	23	43	16	44	9	45	2
63	41	53	42	46	43	40	44	33	45	27
64	42	15	43	9	44	3	44	57	45	51
65	42	37	43	50	44	25	45	19	46	14
66	42	56	43	51	44	46	45	41	46	36
67	43	16	44	11	45	6	46	2	46	57
68	43	3	44	30	45	26	46	22	47	17
69	43	53	44	48	45	45	46	41	47	37
70	44	10	45	6	46	3	46	59	47	56
71	44	26	45	23	46	20	47	16	48	13
72	44	42	45	39	46	36	47	33	48	30
73	44	57	45	54	46	51	47	49	48	46
74	45	11	46	9	47	6	48	4	49	2
75	45	24	46	22	47	20	48	18	49	16
76	45	37	46	3[illegible]	47	33	48	32	49	30
77	45	48	46	46	47	44	48	43	49	42
78	45	58	46	57	47	55	48	54	49	53
79	46	8	47	7	48	5	49	4	50	3
80	46	17	47	16	48	15	49	14	50	13
81	46	25	47	24	48	23	49	23	50	22
82	46	33	47	32	48	31	49	31	50	30
83	46	39	47	38	48	38	49	37	50	37
84	46	44	47	44	48	44	49	43	50	43
85	46	49	47	49	48	49	49	48	50	48
86	46	53	47	53	48	53	49	52	50	52
87	46	56	47	56	48	56	49	55	50	55
88	46	58	47	58	48	58	49	58	50	58
89	46	59	47	59	48	59	49	59	50	59
90	47	0	48	0	49	0	50	0	51	0

A Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

°	52 ′	″	53 ′	″	54 ′	″	55 ′	″	56 ′	″
0	0	0	0	0	0	0	0	0	0	0
1	0	54	0	55	0	57	0	58	0	59
2	1	48	1	50	1	53	1	55	1	57
3	2	43	2	46	2	50	2	53	2	56
4	3	38	3	42	3	46	3	50	3	54
5	4	32	4	37	4	42	4	48	4	52
6	5	26	5	32	5	38	5	45	5	50
7	6	20	6	28	6	35	6	42	6	49
8	7	14	7	23	7	31	7	39	7	47
9	8	8	8	18	8	27	8	36	8	45
10	9	2	9	12	9	22	9	33	9	43
11	9	55	10	7	10	18	10	30	10	41
12	10	48	11	1	11	13	11	26	11	38
13	11	42	11	55	12	9	12	22	12	35
14	12	3	12	49	13	4	13	18	13	32
15	13	28	13	43	13	54	14	14	14	29
16	14	20	14	36	14	53	15	9	15	25
17	15	12	15	29	15	47	16	4	16	22
18	16	4	16	22	16	41	16	59	17	18
19	16	56	17	15	17	35	17	54	18	13
20	17	47	18	7	18	28	18	48	19	8
21	18	38	18	59	19	21	19	42	20	3
22	19	28	19	51	20	13	20	36	20	58
23	20	19	20	42	21	6	21	29	21	52
24	21	9	21	33	21	58	22	22	22	46
25	21	59	22	24	22	49	23	14	23	39
26	22	48	23	14	23	40	24	6	24	32
27	23	36	24	4	24	31	24	58	25	25
28	24	25	24	53	25	21	25	49	26	17
29	25	13	25	42	26	11	26	40	27	9
30	26	0	26	30	27	0	27	30	28	0

The

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

°	52 '	52 "	53 '	53 "	54 '	54 "	55 '	55 "	56 '	56 "
30	26	0	26	30	27	0	27	20	28	0
31	26	47	27	18	27	49	28	20	28	50
32	27	34	28	5	28	37	29	9	29	40
33	28	20	28	52	29	25	29	57	30	29
34	29	5	29	38	30	12	30	45	31	18
35	29	50	30	24	30	58	31	34	32	7
36	30	34	31	9	31	44	32	22	32	55
37	31	18	31	53	32	29	33	7	33	42
38	32	1	32	37	33	14	33	51	34	28
39	32	43	33	21	33	59	34	36	35	14
40	33	25	34	4	34	43	35	21	35	59
41	34	7	34	46	35	26	36	5	36	44
42	34	48	35	28	36	8	36	48	37	28
43	35	28	36	9	36	52	37	31	38	11
44	36	8	36	49	37	31	38	13	38	54
45	36	47	37	29	38	11	38	54	39	36
46	37	25	38	8	38	51	39	34	40	17
47	38	2	38	46	39	29	40	13	40	57
48	38	38	39	23	40	7	40	52	41	36
49	39	14	40	0	40	45	41	30	42	15
50	39	50	40	36	41	22	42	8	42	54
51	40	25	41	11	41	58	42	45	43	31
52	40	59	41	46	42	33	43	21	44	8
53	41	32	42	19	43	7	43	55	44	43
54	42	4	42	52	43	41	44	29	45	18
55	42	35	43	24	44	14	45	2	45	52
56	43	6	43	56	44	46	45	35	46	26
57	43	36	44	28	45	17	46	7	46	58
58	44	6	44	57	45	48	46	39	47	29
59	44	34	45	26	46	17	47	9	47	59
60	45	2	45	54	46	46	47	38	48	29

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

°	52 ′	″	53 ′	″	54 ′	″	55 ′	″	56 ′	″
60	45	2	45	54	46	46	47	38	48	29
61	45	29	46	21	47	14	48	6	48	58
62	45	55	46	48	47	41	48	34	49	27
63	46	20	47	13	48	7	49	0	49	54
64	46	45	47	38	48	32	49	26	50	20
65	47	8	48	2	48	56	49	51	50	45
66	47	30	48	25	49	20	50	15	51	9
67	47	52	48	47	49	42	50	38	51	32
68	48	13	49	9	50	4	51	0	51	54
69	48	33	49	29	50	25	51	21	52	15
70	48	52	49	48	50	45	51	41	52	35
71	49	10	50	7	51	4	52	0	52	55
72	49	27	50	25	51	22	52	19	53	15
73	49	44	50	41	51	39	52	36	53	33
74	50	0	50	57	51	55	52	53	53	50
75	50	14	51	12	52	10	53	8	54	6
76	50	28	51	26	52	25	53	23	54	21
77	50	40	51	38	52	37	53	36	54	34
78	50	52	51	50	52	49	53	48	54	46
79	51	2	52	1	53	0	53	59	54	57
80	51	12	52	11	53	10	54	10	55	7
81	51	21	52	20	53	19	54	19	55	17
82	51	30	52	29	53	28	54	28	55	26
83	51	37	52	36	53	35	54	35	55	34
84	51	43	52	42	53	42	54	42	55	42
85	51	48	52	47	53	47	54	47	55	47
86	51	52	52	52	53	52	54	52	55	52
87	51	55	52	55	53	55	54	55	55	55
88	51	58	52	58	53	58	54	58	55	57
89	51	59	52	59	53	59	54	59	55	59
90	52	0	53	0	54	0	55	0	56	0

The

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

°	57 ′	57 ″	58 ′	58 ″	59 ′	59 ″	60 ′	60 ″	61 ′	61 ″
0	0	0	0	0	0	0	0	0	0	0
1	1	0	1	1	1	2	1	3	1	4
2	1	59	2	1	2	3	2	5	2	7
3	2	59	3	2	3	5	3	8	3	11
4	3	58	4	3	4	7	4	11	4	15
5	4	57	5	3	5	9	5	14	5	19
6	5	57	6	3	6	10	6	16	6	22
7	6	57	7	4	7	12	7	19	7	26
8	7	56	8	4	8	13	8	21	8	29
9	8	55	9	4	9	14	9	23	9	32
10	9	54	10	4	10	15	10	25	10	35
11	10	52	11	4	11	15	11	27	11	38
12	11	51	12	3	12	16	12	28	12	40
13	12	49	13	3	13	16	13	30	13	43
14	13	47	14	2	14	16	14	31	14	46
15	14	45	15	1	15	16	15	31	15	48
16	15	42	15	59	16	15	16	32	16	49
17	16	39	16	57	17	15	17	32	17	50
18	17	36	17	55	18	13	18	32	18	51
19	18	33	18	52	19	11	19	32	19	52
20	19	29	19	50	20	10	20	31	20	52
21	20	25	20	46	21	8	21	30	21	51
22	21	21	21	43	22	6	22	28	22	50
23	22	16	22	39	23	3	23	26	23	49
24	23	11	23	35	24	0	24	24	24	48
25	24	5	24	30	24	56	25	21	25	46
26	24	59	25	25	25	52	26	18	26	44
27	25	52	26	19	26	47	27	14	27	41
28	26	45	27	14	27	42	28	10	28	38
29	27	38	28	7	28	36	29	5	29	34
30	28	30	29	0	29	30	30	0	30	30

A Table *of the Moon's Parallax in Longitude and Latitude continued.*

The Moon's Horizontal Parallax.

°	57 ′	57 ″	58 ′	58 ″	59 ′	59 ″	60 ′	60 ″	61 ′	61 ″
30	28	30	29	0	29	30	30	0	30	30
31	29	22	29	51	30	23	30	54	31	25
32	30	13	30	44	31	16	31	48	32	20
33	31	3	31	35	32	8	32	41	33	14
34	31	52	32	26	32	59	33	33	34	7
35	32	41	33	16	33	50	34	25	34	59
36	33	30	34	5	34	41	35	16	35	51
37	34	18	34	54	35	30	36	6	36	42
38	35	5	35	42	36	19	36	56	37	33
39	35	52	36	30	37	7	37	45	38	23
40	36	38	37	17	37	55	38	34	39	13
41	37	24	38	3	38	42	39	22	40	1
42	38	9	38	49	39	29	40	9	40	49
43	38	53	39	34	40	14	40	55	41	36
44	39	36	40	18	40	59	41	41	42	23
45	40	18	41	1	41	43	42	26	43	8
46	41	0	41	44	42	27	43	10	43	53
47	41	41	42	25	43	9	43	53	44	37
48	42	21	43	6	43	50	44	35	45	20
49	43	1	43	46	44	31	45	17	46	2
50	43	40	44	26	45	12	45	58	46	44
51	44	18	45	5	45	51	46	38	47	24
52	44	56	45	43	46	30	47	17	48	4
53	45	31	46	19	47	7	47	55	48	43
54	46	6	46	55	47	43	48	32	49	21
55	46	41	47	30	48	19	49	8	49	58
56	47	15	48	5	48	54	49	44	50	34
57	47	48	48	38	49	28	50	19	51	9
58	48	20	49	11	50	2	50	53	51	44
59	48	51	49	43	50	34	51	26	52	17
60	49	22	50	14	51	6	51	58	52	50

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

°	57 '	57 "	58 '	58 "	59 '	59 "	60 '	60 "	61 '	61 "
60	49	22	50	14	51	6	51	58	52	50
61	49	51	50	44	51	36	52	29	53	21
62	50	20	51	13	52	6	52	59	53	52
63	50	47	51	41	52	34	53	28	54	21
64	51	14	52	8	53	2	53	56	54	50
65	51	40	52	34	53	28	54	23	55	17
66	52	5	52	59	53	54	54	49	55	44
67	52	28	53	23	54	18	55	14	56	9
68	52	51	53	47	54	42	55	38	56	34
69	53	13	54	9	55	5	56	1	56	57
70	53	34	54	30	55	27	56	23	57	19
71	53	54	54	50	55	47	56	44	57	40
72	54	13	55	10	56	7	57	4	58	1
73	54	31	55	28	56	25	57	23	58	20
74	54	48	55	46	56	43	57	41	58	39
75	55	4	56	2	57	0	57	58	58	56
76	55	19	56	18	57	16	58	14	59	12
77	55	32	56	31	57	29	58	28	59	26
78	55	45	56	44	57	42	58	41	59	40
79	55	57	56	56	57	54	58	53	59	52
80	56	8	57	7	58	6	59	5	60	4
81	56	18	57	17	58	16	59	15	60	14
82	56	27	57	26	58	26	59	25	60	24
83	56	35	57	34	58	33	59	33	60	32
84	56	42	57	41	58	40	59	40	60	40
85	56	47	57	46	58	46	59	46	60	46
86	56	52	57	51	58	51	59	51	60	51
87	56	55	57	55	58	55	59	55	60	55
88	56	58	57	58	58	58	59	58	60	58
89	56	59	57	59	58	59	59	59	60	59
90	57	0	58	0	59	0	60	0	61	0

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

°	62 ′	″	°	62 ′	″	°	62 ′	″
0	0	0	30	31	0	60	53	42
1	1	4	31	31	56	61	54	13
2	2	8	32	32	52	62	54	44
3	3	13	33	33	46	63	55	14
4	4	18	34	34	40	64	55	44
5	5	23	35	35	33	65	56	11
6	6	28	36	39	26	66	56	38
7	7	33	37	37	18	67	57	3
8	8	38	38	38	10	68	57	28
9	9	42	39	39	0	69	57	52
10	10	46	40	39	50	70	58	16
11	11	49	41	40	39	71	58	37
12	12	52	42	41	28	72	58	58
13	13	56	43	42	16	73	59	17
14	15	0	44	43	4	74	59	36
15	16	2	45	43	50	75	59	53
16	17	4	46	44	36	76	60	10
17	18	6	47	45	20	77	60	24
18	19	8	48	46	4	78	60	38
19	20	10	49	46	47	79	60	50
20	21	12	50	47	30	80	61	2
21	22	12	51	48	10	81	61	13
22	23	12	52	48	50	82	61	24
23	24	12	53	49	29	83	61	32
24	25	12	54	50	8	84	61	40
25	26	11	55	50	45	85	61	46
26	27	10	56	51	22	86	61	51
27	28	8	57	51	58	87	61	55
28	29	6	58	52	34	88	61	58
29	30	3	59	53	8	89	61	59
30	31	0	60	53	42	90	62	0

The

A Table *of the Sun's Distance from the* Vertex *of* London, *to every Degree of Declination* N. *or* S. *useful in the Construction of Solar Eclipses.*

Sun's Declin. N. & S. °	″	Sun's Decl. Nor. ⊙à Ver. at Noon °	′	at Midni. °	′	Sun's Decl. Sou. ⊙à Ver. at Noon °	′	at Midni. °	′
0 ♈ ♎	0	51	32	51	32	51	32	51	32
1	0	50	32	52	32	52	32	50	32
2	0	49	32	53	32	53	32	49	32
3	0	48	32	54	32	54	32	48	32
4	0	47	32	55	32	55	32	47	32
5	0	46	32	56	32	56	32	46	32
6	0	45	32	57	32	57	32	45	32
7	0	44	32	58	32	58	32	44	32
8	0	43	32	59	32	59	32	43	32
9	0	42	32	60	32	60	32	42	32
10	0	41	32	61	32	61	32	41	32
11 ♉ ♍	0	40	32	62	32	62	32	40	32
12 ♏ ♓	0	39	32	63	32	63	32	39	32
13	0	38	32	64	32	64	32	38	32
14	0	37	32	65	32	65	32	37	32
15	0	36	32	66	32	66	32	36	32
16	0	35	32	67	32	67	32	35	32
17	0	34	32	68	32	68	32	34	32
18	0	33	32	69	32	69	32	33	32
19	0	32	32	70	32	70	32	32	32
20 ♊ ♌	0	31	32	71	32	71	32	31	32
21 ♐ ♒	0	30	32	72	32	72	32	30	32
22	0	29	32	73	32	73	32	29	32
23	0	28	32	74	32	74	32	28	32
23 ♑ ♋	29	28	3	75	1	75	1	28	3

A Table *of Logarithms for the Correction of the Moon's Variation.*

	Mean Anomaly of the Sun.						
	Sig. 0.	Sig. 1.	Sig. 2.	Sig. 3.	Sig. 4.	Sig. 5.	
Deg.	Logar.	Logar.	Logar.	Logar.	Logar.	Logar.	Deg.
0	0.0242	0.0211	0.0125	0.0004	9.9880	9.9787	30
2	0.0242	0.0207	0.0118	9.9995	9.9872	9.9783	28
4	0.0242	0.0203	0.0110	9.9987	9.9865	9.9779	26
6	0.0241	0.0198	0.0102	9.9978	9.9858	9.9775	24
8	0.0240	0.0193	0.0095	9.9969	9.9851	9.9772	22
10	0.0239	0.0188	0.0087	9.9961	9.9844	9.9769	20
12	0.0237	0.0182	0.0079	9.9952	9.9837	9.9766	18
14	0.0235	0.0177	0.0071	9.9944	9.9830	9.9763	16
16	0.0233	0.0171	0.0063	9.9936	9.9824	9.9760	14
18	0.0231	0.0165	0.0055	9.9928	9.9818	9.9758	12
20	0.0229	0.0159	0.0046	9.9920	9.9812	9.9757	10
22	0.0226	0.0153	0.0038	9.9912	9.9807	9.9755	8
24	0.0223	0.0146	0.0029	9.9904	9.9802	9.9754	6
26	0.0219	0.0139	0.0021	9.9896	9.9797	9.9753	4
28	0.0215	0.0132	0.0012	9.9888	9.9792	9.9753	2
30	0.0211	0.0125	0.0004	9.9880	9.9787	9.9753	0
	Sig. 11	Sig. 10.	Sig. 9.	Sig. 8.	Sig. 7.	Sig. 6.	

The

THE foregoing Table ſhould have been placed to follow the Table of the Moon's Variation, *Folio* 101. Its Uſe is, to find the true, or corrected Variation of the Moon. The other ſhews the Moon's greateſt Variation in the Octants, to be 35 Minutes, 10 Seconds: But then that is in the mean Diſtance of the Sun from the Earth.

The Differences that ariſe from the Curvature of the *Orbis Magnus*, and the ſtronger Action of the Sun upon the Moon when Horned and New, than when Gibbous and Full, are allow'd: For by this Table, the greateſt Variation in the other Diſtances of the Sun from the Earth, being in a Proportion compounded of the duplicate Ratio of the time of the Synodical Revolution of the Moon (the time of the Year being given) directly, and the triplicate Ratio of the Sun's Diſtance from the Earth inverſly. Whence Dr. *Halley*, by this Table, makes the greateſt Variation in the Sun's Apogee, 33 Minutes, 16 Seconds; and in his Perigee, 37 Minutes, 13 Seconds; the Eccentricity of the Sun being to the tranſverſe Diameter of the *Orbis Magnus*, as 16 $\frac{11}{12}$ to 1000.

To find the correct Variation by this Table, the Rule is,

Having found the Variation of the Moon, agreeing to her Diſtance from the Sun, by the Table, *Folio* 101, reduce the ſaid Variation into Seconds, and then find the Logarithm thereof, as if it was an Abſolute Number.

Next, with the Sun's Mean Anomaly, take out of this Table the Logarithm anſwering thereto; and ſubtract it from the Logarithm firſt found; and the Remainder is the Logarithm of the correct Variation, as *per* Example.

In the Example of the Calculation of the Moon's Place, *Folio* 88, the Moon's Variation there is put 32′ 49″=1969″.

The Logarithm of 1969″ is	=	3.294246
With the Sun's Mean Anomaly 10ˢ. 17° 46′ 35″, I find, the Logarithm in the Table to be ſubtracted, is		0.0182
Corr. Variation 31′ 28″=1888″ Log.		3.276046

Example

Example 2. Suppose the Sun in Perigee, and the Moon distant from the Sun 45 Degrees, being in her Octant. I demand her greatest Variation ?

☽'s Variation *per* Table, *Fol.* 101, is 35′ 10″ =
=2110′ Log. = 3.24282
Log. found by ☉ mean Anom, 6s, 0° 0′ 0″ is 9.9753

Corr. Variat. of ☽ is 37′ 13′=2233″=Log.=3.348982

Note, The Logarithm found by the Sun's mean Anomaly must always be subtracted, and not added. But when (as in the last Example) the Logarithm to be subtracted exceeds the other Logarithm, the Radius must be added, that Subtraction may be performed; as is plain, if the Examples are duly considered.

☞ This and the two last Pages were sent me by a Gentleman unknown (to whom I return my hearty Thanks) being a *Correction* of the Moon's Variation in Page 101; which having diligently perused, and finding it very useful, it merits a Place in this Work.

FINIS.

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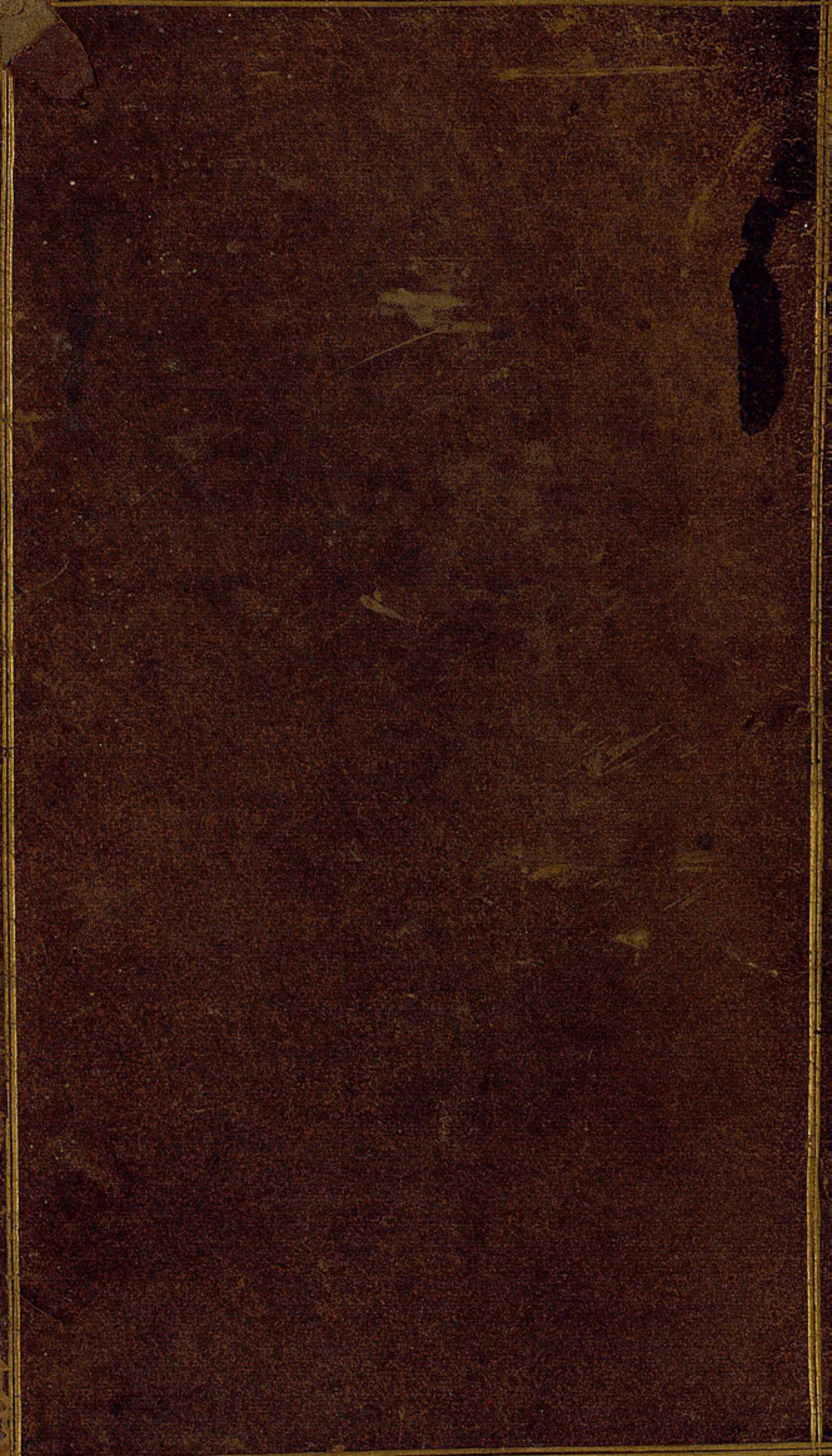
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